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Discrimination in Mortgage Lending: A Study of Three Cities

By A. Thomas King

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Biographical Note

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I alone am responsible for any errors remaining, and all opinions expressed are my own. In particular, the opinions expressed are not intended to reflect those of the Federal Home Loan Bank Board.

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TABLE OF CONTENTS

ABSTRACT 1

Section I. Introduction 3

Section II. Modeling the Decision to Lend 7

Section III. Data Sources and Preparation 11

Section IV. An Analysis of Appraisals 15

Section V. The Decision to Accept or Reject 29

Section VI. Mortgage Terms on Approved Applications 51

Section VII. Eleven Case Studies 71

Section VIII. Summary and Conclusions 75

Appendix A. Analysis of Application Denials (Logit Results) 81

References 87

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LIST OF TABLES

		Page
4.1	"Inadequate Appraised Value" as a Cause of Rejection	16
4.2	Mean Values of Selected Characteristics of Applicants (Analysis of Appraisals)	19
4.3	Definitions of Variables Used in the Analysis of Appraisals	21
4.4	Analysis of Appraised Value	22
5.1	Definitions of Variables Used in the Analysis of Denials	31
5.2	Mean Values of Selected Characteristics of Applicants (Analysis of Denials)	35
5.3	Analysis of Application Denials (OLS Results)	36
6.1	Definitions of Variables Used in the Analysis of Mortgage Terms	53
6.2	Mean Values of Selected Characteristics of Approved Applicants (Analysis of Mortgage Terms)	55
6.3	Miami — Analysis of Mortgage Terms on Approved Applications	56
6.4	San Antonio — Analysis of Mortgage Terms on Approved Applications	61
6.5	Toledo — Analysis of Mortgage Terms on Approved Applications	66
8.1	Evidence of Discrimination in Appraisal Practices	75
8.2	Evidence of Discrimination in Denial of Applications	76
8.3	Evidence of Discrimination in Mortgage Interest Rates	77
8.4	Evidence of Discrimination in Mortgage Term to Maturity	78
8.5	Evidence of Discrimination in Approved Loan/Value	79
Appendix A	Analysis of Application Denials (Logit Results)	81

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Abstract

In 1978 the Federal Home Loan Bank Board collected detailed information on mortgage applications received by federally insured Savings and Loan Associations in three SMSAs during September, October, and November. This study analyzes the applications for evidence that Associations discriminated against applicants because of their age, race, sex, marital status, or the location of the property. The study finds no evidence that property appraisals are discriminatory and little or no evidence that the terms offered on approved mortgages are discriminatory. The study does find statistically significant evidence that black and Hispanic applicants are more likely to be denied than are comparable white applicants. To some extent the differences may be due to worse credit records, a factor which can be incorporated into the analysis only imperfectly because of data limitations. The study finds no evidence that the age, sex, or marital status of the applicant or the location of the property affect the likelihood of rejection.

I. Introduction

In 1978 the Federal Home Loan Bank Board authorized a special survey of all federally insured savings and loan associations in three SMSAs. This survey collected detailed information from mortgage applications received during September, October, and November 1978, including property and applicant characteristics, mortgage terms requested, and the final disposition of the application. These data were collected to permit a careful analysis of discrimination in mortgage lending on the basis of the age, race, sex, or marital status of the applicant, or the location of the property. This monograph presents the results of that analysis.

Discrimination in mortgage lending can occur at many stages of the application process. First, "prescreening" can occur. This means that potential applicants are discouraged from becoming active applicants. If lenders discriminate by suggesting that an application is costly and the likelihood of approval is low, no application may be filed. If no formal application is filed, nothing will be recorded which might indicate a higher rejection rate for minority applicants. Prescreening could be quite subtle and might involve little active discouragement by the lender; just the knowledge or "conviction" from past experience or rumors that an application is futile, costly, and ultimately embarrassing might be sufficient to prevent a formal application.

One might try to use the record of formal applications to uncover prescreening by comparing actual applications from specified minorities or locations with those that might have been expected. For example, a lender in a mostly black area might be expected to receive some mortgage applications from blacks; if there were none, one might suspect prescreening. It has also been suggested that if pre-screening occurs, those minority applicants who do appear on the formal register will be unusually well qualified, making this a test for prescreening. There is some merit to both these suggestions, but clear difficulties also because of the need to estimate "expected" applications. This will depend on the need for mortgage financing by area and type of resident and also on how the requests for mortgages are divided among different lenders. The formidable problems in modeling these issues mean that this study will not attempt to detect prescreening.

A second form of discrimination involves property appraisal. It is frequently alleged that lenders discriminate by reducing the

appraisal for non-economic reasons on mortgage applications they wish to deny. A very low appraisal will permit them to reject the application or to require such a large down payment that the applicant is unwilling or unable to complete the transaction. The hypothesis that the ratio of appraised value to purchase price varies systematically with characteristics of the purchaser or the property are tested in Section 4 of this study.

A third form of discrimination involves the decision to accept or reject a mortgage application. The decision should reflect the risks involved, which depend on the collateral and the creditworthiness of the applicant. If the age, race, sex, or marital status of the applicant, or location of the property affect the decision, after allowing for proper measures of risk, the decision is discriminatory. The application data are analyzed for signs of such discrimination in Section 5.

Variations in the mortgage terms on approved applications are a fourth type of alleged discrimination. Section 6 tests whether the rate of interest, term-to-maturity, or loan-to-value ratio are affected by applicant or property characteristics unrelated to risk. This is the most complicated analysis because the loan terms are determined simultaneously and must be analyzed accordingly. Also, the terms approved may be affected by the terms the applicant requests, particularly by the down payment or loan-to-value ratio. The analysis must consider the possibility that the applicant will try to bargain for one term which is more than usually favorable by requesting another term which is less favorable. Ignoring the simultaneity or the requested term could lead to erroneous inferences about discrimination by the lender.

The analysis of the decision to accept or reject a mortgage application permits one to identify a number of possible cases of discrimination. These are applications from minorities that have been rejected although the predicted probability of rejection is quite low. It has been possible to return to the loan files for some of these cases to see whether additional information would alter the judgment of possible discrimination. Section 7 summarizes what was learned in eleven cases. The results are extremely interesting and important for both this study and others that use a similar procedure to detect possible discrimination in mortgage lending.

The analysis in this study is conducted separately for each of the three SMSAs, but within each SMSA data from all S&Ls are pooled. Accordingly, the results do not imply anything about discriminatory practices by individual lenders. Apparent discrimination in the pooled results does not imply that all lenders discriminate, nor does failure to detect discrimination in the pooled sample exclude discriminatory behavior by an individual institution.

The primary reason for pooling data from all S&Ls is simply that the activity levels in most S&Ls are too low over a three-month period to yield sufficient data for analysis; still, the analysis using pooled data should not be viewed merely as a compromise required by limited sample size or confidentiality. Analysis using pooled data is not appropriate as a guide to the behavior of individual lenders, but it is appropriate as a guide to market conditions. For many purposes the latter is the more important. Discrimination by individual lenders is repugnant, but the implications for the welfare of the classes discriminated against are quite different depending on whether the market on the whole is discriminatory or non-discriminatory. If the market is non-discriminatory, minorities can avoid institutions that discriminate and thereby avoid financial losses. If discrimination is pervasive, they cannot do this.

II. Modeling the Decision to Lend

The outcome of a mortgage application might be modeled in two ways: first, as one multi-faceted decision in which the decision to accept is made simultaneously with a decision setting the loan terms, or, second, as a sequence of decisions, initially deciding whether to accept, and only then setting the terms. In support of the first version one could argue that the decision to accept or reject an application cannot be reached without considering the mortgage terms. The risk of loss accepted by the lender when a mortgage is approved depends very much on the mortgage terms. An application too risky to accept at one set of terms could be quite safe at others. For example, the apparent risk could be reduced by lowering the loan-to-value ratio or the reward for taking the risk could be increased by increasing the mortgage rate.

The basis for the second model is the belief that complicated decisions are made as a sequence of simpler decisions. In the case of the mortgage application this means that the lender initially considers whether the characteristics of the property and the applicant are such that an acceptable package of loan terms could probably be put together. If the lender considers that it could not be, the application is rejected. Only if the application is accepted does the lender put together a specific package of terms and offer this to the applicant.

This study will assume that the model of sequential decisions is appropriate as a guide for the empirical analysis. One reason is that the somewhat limited variations observed in mortgage terms seem more consistent with an initial "cut-off" than with a flexible adjustment of terms to a wide range of risk. Another reason is that it is more difficult to make complex multi-faceted decisions, so that lenders should be expected to avoid them.

a) The decision to accept or reject

The model of sequential decisionmaking implies sequential empirical analyses. The first step is analysis of the decision to accept or reject an application. At this stage only one mortgage term will be considered relevant; namely, the applicant's requested down payment or loan-to-value ratio. The analysis will include this because the loan-to-value ratio is a significant aspect of risk and because modification of the requested down payment or loan-to-value may be very difficult for the

applicant to accept. Often the applicant's wealth for making the down payment is the greatest constraint in the search for a dwelling. The applicant who requests a 90 percent loan may be completely unable to consider an 80 percent loan, but a mortgage offered at a higher interest rate or shorter term than requested would not be equally unacceptable.

The analysis assumes that the decision to accept or reject an application will be affected by a variety of applicant and property characteristics, in addition to the requested loan-to-value. For convenient reference these have been divided into three groups, "proper business considerations," "possibly proper considerations," and "improper considerations." The "proper business considerations" are variables which clearly relate to the risk of default or loss if the application is approved. These include a measure of the creditworthiness of the applicant, the requested loan-to-value, the use of private mortgage insurance (PMI) or FHA-VA insurance, the ratio of requested monthly payment to income, and the ratio of existing monthly debt obligations to income.

The analysis includes only three "possibly proper considerations," property age, location, and proportion of total income contributed by a second worker. These variables are distinguished from others because any influence on the decision to accept or reject could reflect either discrimination or an effect on risk. For example, it is sometimes alleged that lenders discriminate against two-earner families by discounting the income of a working wife. But it is also possible that households with a second worker will have a more stable income stream, which should reduce the risk of default. If lenders recognize this, they might favor two-earner households. Consequently, it is uncertain whether one should expect to find that applicants having a second income would be more or less likely to be rejected. Property age is designated "possibly proper" not because the effect is likely to be ambiguous but because the interpretation is. Bank Board regulations forbid S&Ls to use property age to automatically disqualify an application, but it is not improper to consider condition, and older properties are more likely than new ones to be in poor condition. Therefore, one can expect that older properties are more likely to be denied a mortgage; but with the evidence available to this study, it is impossible to know whether this is discriminatory.

This study includes location as a "possibly proper" consideration. Allegations that lenders "redline" certain areas, approving no loans there or loans on inferior terms, make it important to consider this type of discrimination. However, neighborhood conditions do affect the value of individual properties, and lenders are not forbidden to take these into account, when the influence can be well demonstrated. Accordingly,

property location may seem to affect the likelihood that an application will be accepted, but that may or may not imply discrimination.

The age, race, sex, and marital status of the mortgage applicant are designated "improper considerations." By statute and Bank Board regulation these may not be used to deny credit or offer less favorable terms. Any evidence of this must be judged a sign of discrimination, provided that differences in risk have been properly incorporated.

b) Setting the mortgage terms

The second stage of the analysis concerns the terms offered on approved applications. Two important features of the process are incorporated into the model. First, it is anticipated that the three mortgage terms — rate of interest, term-to-maturity, and loan-to-value — are set simultaneously. It is not difficult to explain this. Studies of mortgage default have repeatedly shown that the risk of default increases with the loan-to-value ratio.[1] One way to offset this is to shorten the term-to-maturity: the shorter the term, the more rapidly the applicant's equity builds up, decreasing the lender's exposure to loss. Another response to higher risk in high loan/value mortgages is to increase the interest rate as a reward for risk taking. In short, the amount of risk and the reward for accepting it depend on the three terms taken together.

The second feature concerns the relationship between the terms originally requested and those granted. This is a very murky issue. Very little is known about how applicants decide what mortgage terms to request. Sometimes the applicant may have strong preferences for one or more terms, but often the applicant first asks what the lender's current terms are and then requests those terms. When this happens, is it reasonable to analyze the terms approved as though the terms requested play an independent role? The answer might seem to be "no," but suppose that the applicant did have an independently established set of desired terms and has shopped around to find a lender whose policies coincided with those wanted. When this happens, it seems more reasonable to treat the requested terms as influences on the terms granted.

Leaving aside the matter of how requested terms are set, it is doubtful that each of the three requested terms would be of equal influence on the terms approved. Very likely, the most influential requested term is the loan-to-value ratio. Often the ability to make a down payment is severely restricted, if not by too little wealth, by the need to convert wealth from one form to another with heavy transaction costs and the realization of paper losses or taxable capital gains. Consequently, an

[1]See von Furstenberg (1969) or von Furstenberg and Green (1974).

applicant may consider approval of an application at a lower loan/value ratio than requested as tantamount to rejection.

The least influential requested term is probably the rate of interest. The lender knows that the market value of the mortgage depends in a particularly clear and simple way on the difference between the morgage rate approved and the market rate for comparable securities. The applicant may request a lower-than-market rate and may even try to bargain for it by accepting other terms that are less favorable, but the lender will probably not permit much deviation because of the financial consequences.

The significance of the requested term-to-maturity is more uncertain. In one respect a shorter term has the same consequence as a higher interest rate; namely, a higher monthly payment per dollar borrowed. An applicant motivated primarily to keep the monthly payment low will request a long term and a low interest rate; possibly, lenders give no attention to either one. The complication is that some persons are interested in the rapid accumulation of equity; for them a shorter term is desirable since it means more than just a higher monthly payment. Possibly, this means that a lender will honor a request for a shorter than maximum term but disregard a request for the maximum thirty-year term.

The empirical analysis of the loan terms will require simultaneous equation methods to allow for the interactions among the three terms. Also, the analysis will allow for the possible influence of requested terms on the terms approved. As in the analysis of the decision to accept or reject an application, the analysis of terms approved will attempt to control for risk differences between applications using a group of variables describing "proper business considerations." "Improper considerations" will be included to test for discrimination on the basis of age, race, sex, or marital status. "Possibly proper considerations" will be included for the same reasons as in the analysis of the decision to accept or reject.

III. Data Sources and Preparation

The data for this study were collected by special examination of all S&L members of the Federal Home Loan Bank System that have their main offices in the Miami, Florida; San Antonio, Texas; or Toledo, Ohio SMSAs. The branch offices within these SMSAs of S&Ls whose main office was outside were also included if the branches were sufficiently large. A total of 45 S&Ls are included, 17 in Miami, 15 in San Antonio, and 13 in Toledo.

These three SMSAs were selected for study for several reasons. First, medium size SMSAs were desired so that the cost of the special examination, which depends on the number of S&Ls and the number of applications received, would not be too great. Second, to have adequate application volume for analysis of individual S&Ls, the SMSAs should have some large S&Ls. (However, no analysis of individual S&Ls is reported here.) Third, the SMSAs should have substantial proportions of minorities. Fourth, allegations of redlining or other forms of mortgage discrimination were desirable, as they suggested the likelihood of a problem to study. Fifth, areas with extensive statewide branching were excluded, to minimize the number of S&Ls for examination.

Regular FSLIC examiners conducted special examinations in the three SMSAs, collecting data for all loan applications received in September, October, and November 1978. Once keypunched, individual applications were subjected to careful scrutiny for internal consistency, and the values of individual variables were compared to plausible ranges. Applications with possible errors were returned to the examiner to be checked; they were included in the data base only after the values were corrected or verified. It is likely that the resulting data are basically correct, or at least accurately reflect the information available at the S&L.

In Miami a total of 5,374 applications were collected, in San Antonio 2,014, and in Toledo 2,650. The analysis in this paper is based on that subset of these applications that was for the purchase, refinance, or construction with permanent financing of owner-occupied, residential properties with census tract known. Thus, for example, there is no analysis of loan applications for home improvement, for commercial property, or for land purchase.

The restrictions mentioned reduce the sample sizes by about one third, but not all of those remaining can be used in the analysis because of missing data. Approximately 30 percent of the applications

are excluded for this reason, the proportions varying somewhat depending on the SMSA and the particular analysis. Selected characteristics of applications included and excluded are presented at the beginning of each empirical analysis. In general there appear to be few systematic differences between the applications used in the analyses and those excluded because of missing data.

To permit analysis of geographical discrimination, or "redlining," census tract data were collected for each house for which a mortgage was requested. Ideally, the analysis would include measures of risk that vary with location and would determine whether treatment of mortgage applications seemed to vary with location after allowing for location-specific risk differences. In practice, it has been difficult to do this. The best indication of location risk would be the trend and variance of property values by location, but statistics on these were unavailable. Instead, the study uses five measures of census tract characteristics taken from the 1970 Census of Housing — percent of population black, percent of population Spanish-surname, percent of housing units owner-occupied, percent of units built before 1939, and percent of population with income below the official 1970 poverty level. These measures of neighborhood characteristics have obvious flaws as indicators of discrimination. 1970 census tract characteristics may be quite different from 1978 characteristics; moreover, it is difficult to know whether any significance reflects discrimination or merely correlation with risk. For these reasons, coefficients of the five census tract variables must be interpreted very cautiously.

An alternative approach to the analysis of locational discrimination involves dividing the SMSA into discrete, homogeneous areas. Using dummy variables it is possible to test whether applications from one area are treated differently from others. One of the reasons for including Toledo in the study is that it is a city where this is particularly appropriate because of strong ethnic subdivisions. The Toledo Department of Community Development, Division of Housing and Relocation has prepared a booklet, *Guide to Toledo Neighborhoods 1977–78*, delineating these. The present study has converted those neighborhoods into census tract equivalents for use with dummy variables. No comparable information was found for the other two SMSAs that would have permitted distinguishing various neighborhoods. 1970 census data suggest that distinct neighborhoods do exist, but analysis found that neighborhoods defined on the basis of census data were no more useful and much more cumbersome than were the original census data.

The analysis of locational discrimination is unquestionably limited by the limited and ambiguous data describing risk variations by neighborhood. If the analysis finds that applications from comparable

persons for comparable properties are treated differently depending on the location of the property, it will be impossible to say whether the cause is discrimination, risk differences, or other considerations like portfolio balance. However, if the analysis finds no difference in treatment by neighborhood, there will be reasonably good evidence that lenders are not discriminating by area. The evidence from Toledo should be especially valuable because of the up-to-date neighborhood definitions.

In most respects the data base used in this study is superior to what any previous studies of lending discrimination have had. It is, for example, more recent and provides more detail on critical variables than did the sample available to Schafer (1978) for his study of lending discrimination in New York State. It is similar to but still somewhat more detailed than the data used by Schafer and Ladd in their study of California lenders (1980). The chief deficiency is that none of the three SMSAs is heavily black. At the time the sites were selected it was expected that application flows would be large enough that the number of black applicants would be quite acceptable, but, subsequently, rising interest rates dampened activity, making the number of black applicants smaller than one would prefer. In both Miami and Toledo there are about 150 black applicants available for the analysis of appraisal practices, and in San Antonio there are 50. In both Miami and Toledo there are about 70 black applicants available for the analysis of rejections and mortgage terms, and in San Antonio there are 10. In contrast to the limited number of blacks, the number of Hispanics is large in both Miami and San Antonio, amounting to about 20–25 percent of the sample.

The samples of black applicants in Toledo and Miami appear to be large enough for statistically significant results; any consistent patterns of discrimination against black applicants should be disclosed. However, any implications about discrimination against blacks in San Antonio should be regarded as tenuous because of the small sample size. The same reservation holds for the analysis of discriminatory patterns involving Hispanic applicants in Toledo, where the number of applications is also quite small.

IV. Analysis of Appraisals

One of the lender's first responses to a mortgage application is to order a property appraisal. To the lender the appraised value is important because it indicates the protection from loss should the mortgagor default. To the applicant the appraised value is important because it limits the amount that can be borrowed and implies a down payment. Possibly because of its central importance to the decision on an application and because appraisal methods are inexact and not well understood, allegations of discrimination in appraisals are common. For example, a widely circulated list of eleven "Methods of Redlining" includes three related to appraisal: delaying unnecessarily, reducing the appraised value in relation to the market value arbitrarily, and setting unnecessarily rigid appraisal standards.[2] This study has no way of examining whether delays were excessive or the standard of appraisal too rigid, but the data permit two ways to examine whether lenders rely on appraisals to discriminate or to redline.

One possibility is to see how often lenders reject an application and claim that the property is inadequate collateral for the loan. This can be done using a code for "reason for rejection" from the Loan Application Register Study (LARS) form. Table 4.1 shows that relatively few applications are rejected because of "inadequate appraised value." Moreover, the applications rejected for this reason are not primarily from minorities, nor is there evidence that the applications are clustered geographically.

The second possibility requires more elaborate analysis. Lenders may not reject an application outright on the basis of a discriminatory appraisal but instead may use the lower appraised value to require a larger down payment. That could effectively discourage the applicant, but it would not be revealed in Table 4.1. To test for this, it is necessary to examine directly for systematic patterns in the ratio of appraised value to price, attempting to relate these to borrower or property characteristics.

The analysis of the ratio of appraised value to price will consider the following personal and property characteristics: the age, race, sex, and marital status of the applicant, and the age and location of

[2]Governor Dan Walker, State of Illinois, Statement in *Hearings* before the Committee on Banking, Housing and Urban Affairs on Home Mortgage Disclosure Act of 1975, 94th Congress, 1st Session, May 5, 6, 7, and 8, 1975.

Table 4.1

"Inadequate Appraised Value" as a Cause of Rejection

Miami

	Applications Received	Rejected for "inadequate appraised value" Number	Percent
Race			
Black	139	6	4
White	3385	89	3
Hispanic	931	22	2
Other	162	4	2
Total*	4617		
Census Tract**			
704.00	10	3	30
1.01	19	2	11
1.02	43	2	5
61.01	44	3	7
75.00	25	2	8
77.00	50	2	4
84.02	66	4	6
84.03	56	2	4
88.02	22	2	9
102.00	23	3	13
103.00	30	2	7
115.00	13	2	15

Table 4.1 *(Continued)*

"Inadequate Appraised Value" as a Cause of Rejection

San Antonio

	Applications Received	Rejected for "inadequate appraised value" Number	Percent
Race			
Black	54	0	0
White	1197	7	1
Hispanic	448	6	1
Other	88	0	0
Total*	1787		
Census Tract**			
1906	20	2	10

Toledo

	Applications Received	Rejected for "inadequate appraised value" Number	Percent
Race			
Black	141	1	1
White	1947	24	1
Hispanic	24	0	0
Other	84	1	1
Total*	2196		
Census Tract**			
95	27	2	7

* Total Applications are those for loans (including home improvement loans) related to residential owner-occupied dwellings.

** Census Tract: only those with more than 1 rejection because of inadequate appraised value are listed.

the property. No elaborate model explains the choice of these particular variables, only the presumption that if lenders consistently discriminate, stratifying the sample in these ways should reveal it.

In addition to personal and property characteristics, the analysis will consider whether the ratio of appraised value to price varies with the type of financing requested, distinguishing private mortgage insurance (PMI), FHA-VA, and conventional. In the mid-1970s many community activist groups blamed "excessive" FHA financing for neighborhood deterioration. It was alleged that FHA deliberately over-appraised houses so that financially unqualified persons could purchase them. These persons soon were unable to make needed repairs or continue mortgage payments, leading to foreclosures and widespread abandonment. If the FHA were continuing to over-appraise, failure to distinguish type of financing might obscure discrimination on the basis of race or location, since FHA-VA financing is heavily used by minorities and in some areas.

In each of the three SMSAs ordinary least squares (OLS) regression has been used to estimate:

$$\frac{\text{appraised value}}{\text{purchase price}} = \text{f(personal characteristics, property characteristics, location characteristics, type of financing)} + \mu.$$

Each equation contains a set of dummy variables for individual S&Ls[3] and, in Toledo, for individual neighborhoods. The data set in each SMSA consists of all applications for residential, owner-occupied properties without missing data for the various personal, property, and type of financing variables. Observations have also been omitted if the ratio of appraised value/purchase price exceeds 1.2 because such transactions are likely not proper arms-length. Moreover, such appraisals are in favor of the applicant and do not imply discrimination.[4]

Largely because of missing data the sample useable in the OLS regression is reduced by one-third to one-half. Table 4.2 presents some characteristics of observations omitted and used in the regressions. In general it appears that racial minorities are somewhat more likely to be omitted because of missing data. The proportion married is about the same in both groups in all three cities, and the proportion male is similar except in San Antonio. Average age and income must be compared very cautiously since the calculations are based only on those applicants reporting this information, and those not reporting may be a nonrandom

[3]In each SMSA the dummy variable for the largest S&L is omitted to avoid singularity; also, dummies for certain small S&Ls may be missing. After records with relevant missing data were eliminated, some small S&Ls had no records left for analysis.

[4]Although it seems best to eliminate observations with high ratios of appraised value to price, the estimated coefficients are not sensitive to this.

Table 4.2

Mean Values of Selected Characteristics of Applicants

(Applications for loans (including home improvement loans) on owner-occupied residential properties)

	Miami		San Antonio		Toledo	
	Omitted*	Used*	Omitted	Used	Omitted	Used
Age	45	42	41	37	37	33
Combined Gross Monthly Income	$2997	$3233	$2009	$2578	$2123	$2088
Sex (Percent Distribution)						
Male	84	85	84	90	90	91
Female	15	15	13	10	09	09
Unknown	00	00	03	00	01	00
Race (Percent Distribution)						
White	76	72	60	77	86	91
Black	05	02	04	01	06	06
Hispanic	14	24	29	19	01	01
Other/Unknown	05	02	07	02	06	02
Married (Percentage)	74	73	78	77	80	76
Number of Applications	1801	2816	1035	752	988	1208

* "Omitted" refers to applications not usable in the OLS analysis because of missing data.
"Used" refers to applications used in the OLS analysis.

sample. Average age appears to be higher for applicants omitted than used, but income is about the same for the two groups except in San Antonio. On the whole, although there are some differences between the two groups in each SMSA, there is no strong reason to suppose that the analysis is biased because of them. It would be quite remarkable if discriminatory appraisals were only or mainly a problem on applications with some missing data.

Miami

The mean value of the ratio of appraised value to purchase price in the Miami sample is .99, and the standard deviation is .05. The range is .6 to 1.9 (however, observations with a value greater than 1.2 are omitted from the OLS analysis). These statistics indicate that, on average, appraised value is very close to purchase price, although there are some large discrepancies. Variables are defined in Table 4.3 and the estimated coefficients for the OLS regression are in Table 4.4. Few of the variables are significant, and the low adjusted R^2 confirms that little of the limited variation has been accounted for. In particular, the sex and marital status are not significant influences on the ratio. The ratio is not lower for either applicants under 25 or over 65 or for blacks, Hispanics, or other nonwhites. None of the census tract variables is significant at the 5% level. The ratio does vary somewhat with the age of the property, but the reductions are very small (less than .01) and do not increase with increasing age. Use of PMI appears to be associated with a significantly higher ratio, though the coefficient is very small and the interpretation uncertain. The most important source of variations in the ratio is differences between individual S&Ls; the set of S&L dummy variables accounts for about 75 percent of the total R^2.[5]

San Antonio

In San Antonio the mean of the ratio of appraised value to purchase price is 1.01, and the standard deviation is .05. The range is .6 to 2.3 (observations with a value greater than 1.2 are omitted from the OLS analysis). As in Miami the appraised value is, on average, very close to the purchase price; while large deviations exist, there is even less evidence of patterns. OLS analysis shows that neither the age, race, sex, nor marital status affects the ratio. Most of the census variables are insignificant. The ratio does appear to decrease significantly with the age of the house; however, this may be offset by the apparent increase in the

[5]In some cases it is possible that using individual S&L dummy variables might conceal discriminatory appraisals by attributing lower appraisals to the institution rather than the mortgage applicant. However, the regressions for all three SMSAs have been run without the S&L dummy variables with no significant change in the other coefficients. For brevity these other regressions are not presented.

Table 4.3

Definitions of Variables Used in the Analysis of Appraisals

AV/PR	Ratio of appraised value to purchase price
PMI	Dummy variable (=1) for applications requesting private mortgage insurance
FHA-VA	Dummy variable (=1) for applications requesting Federal Housing Administration or Veterans Administration insurance
P5-10	Dummy variable (=1) for properties 5-10 years old
P10-25	Dummy variable (=1) for properties 10-25 years old
P25-50	Dummy variable (=1) for properties 25-50 years old
P50-75	Dummy variable (=1) for properties 50-75 years old
P>75	Dummy variable (=1) for properties more than 75 years old
BLACKS	Dummy variable (=1) for black applicants
HISPAN	Dummy variable (=1) for Spanish-American applicants
OTHRNW	Dummy variable (=1) if race is other than white, black or Spanish-American
UNMARR	Dummy variable (=1) if applicant is not married
AGE<25	Dummy variable (=1) if applicant is less than 25 years old
A25-35	Dummy variable (=1) if applicant is 25-35 years old
A55-65	Dummy variable (=1) if applicant is 55-65 years old
AGE>65	Dummy variable (=1) if applicant is greater than 65 years old
%BLACK	Percent black in census tract of property from 1970 Census
%SPAN	Percent Spanish-surnamed in census tract of property from 1970 Census
%OWNOC	Percent owner-occupied properties in census tract of property from 1970 Census
%<1939	Percent of properties in 1970 in census tract which were constructed before 1939
%<POV	Percent of households in 1970 with income below the official poverty level in 1970
S&L1 — S&L17	Dummy variable (=1) for each S&L in sample. Dummy for the largest S&L is omitted
NBH1 — NBH29	Dummy variables (=1) for properties in the specified Toledo neighborhood. The omitted reference dummy variable is for the Toledo suburbs. A superscript 'R' indicates a neighborhood allegedly redlined or one having conditions consistent with neighborhoods allegedly redlined.

Table 4.4

Analysis of Appraised Value

Independent Variables	Miami	San Antonio	Toledo
PMI	0.0091*	0.0083	0.0049
	(3.71)	(1.82)	(1.44)
FHA-VA	−0.0020	0.0038	−0.0472*
	(−0.28)	(0.21)	(−8.72)
P5—10	−0.0080*	−0.0057	0.0019
	(−2.90)	(−0.95)	(0.34)
P10—25	−0.0034	0.0000	0.0100*
	(−1.38)	(0.00)	(2.18)
P25—50	−0.0067*	−0.0111	0.0076
	(−2.18)	(−1.63)	(1.66)
P50—75	−0.0031	−0.0448*	0.0120*
	(−0.38)	(−2.96)	(2.37)
P>75	0.0147		0.0019
	(0.51)		(0.26)
BLACKS	0.0120*	−0.0211	−0.0023
	(1.72)	(−1.12)	(−0.33)
HISPAN	0.0008	0.0008	0.0268*
	(0.33)	(0.14)	(2.16)
OTHRNW	0.0068	0.0128	0.0011
	(1.11)	(1.01)	(0.10)
FEMALE	−0.0016	−0.0038	−0.0055
	(−0.49)	(−0.50)	(−1.10)
UNMARR	0.0000	0.0032	0.0051
	(0.00)	(0.60)	(1.48)
AGE<25	0.0005	−0.0040	0.0070
	(0.11)	(−0.51)	(1.66)
A25—35	0.0017	−0.0020	0.0048
	(0.76)	(−0.47)	(1.53)
A55—65	0.0061*	−0.0008	−0.0044
	(2.06)	(−0.10)	(−0.60)

Table 4.4 *(Continued)*

Analysis of Appraised Values

Independent Variables	Miami	San Antonio	Toledo
A>65	0.0091*	−0.0153	−0.0037
	(2.38)	(−1.30)	(−0.30)
%BLACK	0.0001	−0.0001	−0.0000
	(0.98)	(−0.31)	(−0.09)
%SPAN	−0.0001	0.0002	0.0015
	(−1.16)	(0.76)	(0.92)
%OWNOC	0.0000	0.0000	0.0002
	(0.94)	(0.27)	(1.19)
%<1939	0.0000	0.0003*	−0.0002*
	(0.10)	(1.93)	(−1.69)
%<POV	−0.0003	−0.0003	0.0002
	(−1.46)	(−0.51)	(0.48)
S&L 1	0.0061	−0.0137	0.0159
	(1.24)	(−1.42)	(1.57)
S&L 2	0.0117*	−0.0021	−0.0662*
	(3.51)	(−0.33)	(−2.93)
S&L 3	0.0104*	−0.0078	−0.0040
	(3.10)	(−1.46)	(−0.35)
S&L 4	−0.0278*	−0.0001	−0.0183
	(−6.58)	(−0.01)	(−0.99)
S&L 5	0.0043	−0.0081	−0.0138*
	(1.23)	(−0.64)	(−3.01)
S&L 6	0.0074	−0.0163	−0.0003
	(1.87)	(−0.74)	(−0.09)
S&L 7	−0.0091*	−0.0216	−0.0039
	(−2.18)	(−1.27)	(−0.62)
S&L 8	0.0031	−0.0029	−0.0047
	(0.50)	(−0.24)	(−0.25)
S&L 9	−0.0125*	−0.0416*	−0.0163
	(−2.20)	(−3.22)	(−0.92)

Table 4.4 *(Continued)*

Analysis of Appraised Value

Independent Variables	Miami	San Antonio	Toledo
S&L 10	0.0042		−0.0060
	(0.87)		(−0.99)
S&L 11	0.0104		
	(1.34)		
S&L 12	0.0251		
	(1.24)		
S&L 13	−0.0032		
	(−0.16)		
S&L 14	0.0078		
	(0.52)		
S&L 15	0.0157		
	(1.25)		
S&L 16	0.0339*		
	(2.35)		
NBH 1^R			0.0566*
			(3.08)
NBH 2^R			0.0046
			(0.40)
NBH 3			0.0013
			(0.08)
NBH 4			0.0058
			(0.73)
NBH 5^R			0.0132
			(1.41)
NBH 6			0.0137
			(0.58)
NBH 7^R			0.0519*
			(2.34)
NBH 8^R			0.0181*
			(1.96)

Table 4.4 *(Continued)*

Analysis of Appraised Value

Independent Variables	Miami	San Antonio	Toledo
NBH 9			0.0254
			(1.52)
NBH 10			0.0120
			(1.29)
NBH 11			0.0117
			(0.85)
NBH 12			0.0118
			(1.28
NBH 13			0.0052
			(0.52)
NBH 14			0.0019
			(0.32)
NBH 15			0.0136
			(1.20)
NBH 18^{R}			0.0207*
			(1.64)
NBH 19^{R}			0.0280*
			(1.79)
NBH 20			0.0126
			(1.36)
NBH 21			0.0104
			(1.43)
NBH 22			–0.0121
			(–0.94)
NBH 23			–0.0090
			(–1.05)
NBH 24			0.0043
			(0.57)
NBH 25			0.0061
			(0.61)

Table 4.4 *(Continued)*

Analysis of Appraised Value

Independent Variables	Miami	San Antonio	Toledo
NBH 26			−0.0045 (−0.38)
NBH 27			−0.0005 (−0.08)
NBH 28			0.0100 (0.54)
NBH 29			−0.0105 (−1.37)
Intercept	0.9910* (174.80)	1.0079* (64.69)	0.9843* (50.64)
Dependent Variable	AV/PR	AV/PR	AV/PR
Mean Value of Dependent Variable	0.9922	1.0070	1.0084
Number of Observations	2816	752	1208
Adjusted R^2	0.0459	0.0065	0.0866
S. E. E.	0.0493	0.0519	0.0442

t-values in parentheses.
* Indicates significance at the 5 percent level or greater. One-tail tests are applied where appropriate.

ratio with the percent of houses built before 1939. In any event, the adjusted R^2 of less than .01 implies that no pattern is very strong. Indeed, without the set of S&L dummy variables the adjusted R^2 is negative.

Toledo

In Toledo the mean value of the ratio of appraised value to purchase price is 1.01 with a standard deviation of .05. The range is .5 to 1.8 (observations with a ratio greater than 1.2 are omitted from the

analysis). The adjusted R^2 for the OLS regression is .09. Again, little of the limited variation is accounted for. Neither the age, race, sex, nor marital status of the applicant appears to be a cause of lower appraisals. Of the census tract variables only the percent of units built before 1939 is significant, even at a low level, and the magnitude of the effect is quite small. As in San Antonio the effect of greater average unit age in the neighborhood is contrary to the effect of greater age for the specific unit. Appraisals on older houses in Toledo are significantly higher than for houses less than 5 years old. Though the difference is small, it is contrary to what would be expected if older units were discriminated against.

By far the most significant variable is the dummy for use of FHA-VA insurance. The appraisal ratios for such units are .05 lower than for conventional applications. This is contrary to the common allegation that FHA appraisals have been too high as part of a scheme to dupe unsuspecting purchasers. If that was once true, these results imply that policies are now different. It is interesting to speculate that the lower ratio observed now results from the common tacit agreement between sellers and buyers under which the seller's points are shifted to the buyer by inflating the sales price.

The analysis of Toledo is particularly interesting because the set of neighborhood dummy variables permits the best analysis of locational discrimination or redlining. On the basis of descriptions in the *Guide to Toledo Neighborhoods* and materials submitted to the Bank Board by community groups, nine of the Toledo neighborhoods are identified as ones likely to be redlined, if any are. The nine are neighborhoods 1, 2, 5, 7, 8, 16, 17, 18, and 19. In the tables, they are identified by a superscript 'R'.[6] The important finding is that, relative to the Toledo suburbs, no Toledo neighborhood appears to suffer significantly lower appraisal ratios. To the contrary, most coefficients are positive and some are highly significant.

Summary

Examination of the ratio of appraised value to purchase price has found no evidence consistent with allegations that discrimination or redlining occurs by arbitrarily reducing the appraised value of properties. The mean value of the ratio is very close to 1.0 and the standard deviation is quite small. Large deviations between the appraised value and the purchase price do occur, but there are few discernible patterns to these deviations and none suggesting discrimination.

[6]The Tables do not include dummy variables for neighborhoods 16 and 17 because there were too few applications from these areas to permit them. Some might conclude that receiving so few applications is itself evidence of discrimination in the form of prescreening or of redlining. I believe that would be premature without evidence of a demand for homeownership and mortgage credit in these areas.

Despite the very strong evidence that discriminatory mortgage appraisals are not a serious problem in the three SMSAs studied, it is easy to understand why many individuals would perceive a problem and would be able to cite cases of apparent discrimination. Because appraisals contain such a large element of error, many minorities do receive appraisals for less, sometimes much less, than the purchase price of their home. An individual has no way of knowing, and little interest in knowing, that an erroneous underappraisal of his own property is matched by an erroneous overappraisal of someone else's. The present study does not imply that appraisals yielded by existing methods are good, only that in the areas studied they do not appear to be discriminatory.

This study's finding of no discrimination in appraisals is quite similar to those of Schafer (1978) and Benston, Horsky, and Weingartner (1978) in their studies of certain SMSAs in New York State, but my result is somewhat better founded. Those studies examined only applications that had been approved; thus, it was possible that applications that encountered discrimination were not included in the sample. The present study, however, has examined all applications received regardless of whether the application was ultimately approved. The agreement among all the studies strengthens the conclusion that appraisal discrimination is not an important problem. Persons familiar with appraisal methods will probably not find this a surprising conclusion. Very often appraisals are done in full knowledge of the contract price; in some cases, the appraiser must only verify whether the property is worth at least as much as the contract price. This makes it not surprising that appraised value is, on average, very close to purchase price.

V. The Decision to Accept or Reject

A lender can respond to a mortgage application by accepting it as submitted, accepting it with revisions, or rejecting it. This section analyzes the frequency of rejection to determine whether the age, race, sex, or marital status of the applicant, or the property location affect the decision, after allowing for some of the proper measures of risk. If they do, lenders may be discriminating illegally. Increased likelihood of rejection is not the only possible kind of mortgage discrimination, of course. Lenders might also accept applications but set more unfavorable terms. In keeping with the sequential model of decision making described in Section 2, the possibility of discrimination in setting terms will be analyzed separately from the decision to accept or reject.

The analysis assumes that the outcome of a mortgage application can be described as a function of the various "proper," "possibly proper," and "improper" considerations given in Section 2. Thus,

$$\text{outcome} = f(A \cdot P, B \cdot PP, C \cdot I) + \mu \qquad (1)$$

where A, B, and C are vectors of coefficients. P, PP, and I are respectively vectors of the proper, possibly proper, and improper considerations, and μ is a random error term. "Outcome" is a binary variable assigned the value "1" if the application is rejected and "0" otherwise.

The coefficients of the function will be estimated using ordinary least squares (OLS) and binary logit analysis. Because of the binary dependent variable, it is well known that the error term in (1) is not homoscedastic, thereby violating one of the assumptions required for OLS estimates to be efficient. Whether this is important, particularly in large samples, is by no means clear (Goodman, 1976). Estimated coefficients remain unbiased and consistent. Indeed, Marantz et al. (1976) cite work showing that in the case of a binary dependent variable logit coefficients can be derived directly from the OLS estimates and the t-statistics from the OLS regression can be used to test the significance of the logit coefficients.

Each OLS coefficient has the advantage over its logit counterpart of being much easier to interpret: the coefficient indicates the number of percentage points by which a unit change in the independent variable changes the probability of rejection. In contrast, the logit coefficient cannot be interpreted except with reference to a specified change to

a complete application. This makes it necessary to construct several "representative" applications, each having different values for some particular regressor. By calculating the probability of rejection in each case, one can see how variations in that regressor affect the outcome. Since this procedure must be repeated for each "representative" application, the comparisons rapidly become voluminous and tedious. Given the close correspondence between OLS and binary logit, both for coefficients and for tests of significance, this section will present and comment on OLS results only. Readers who prefer logit analysis because of the superior functional form will find logit equations corresponding to the OLS in Appendix A.

The variables used in the analysis are listed and defined in Table 5.1. The need for most of these is self-explanatory or has been discussed previously. Two which might require some comment are the ratio of monthly payment to income (PAY/Y) and a dummy variable for bad credit history (BADCDT). A common rule of thumb is that the monthly housing payment should not exceed 25 percent of monthly income. In recent years that limit has increasingly been exceeded; nonetheless, the ratio remains a concern to lenders. The higher it is, the more likely the applicant might default if income falls or unexpected expenses occur. The quadratic term (PAY/Y2) permits the effect of the ratio to be non-linear. In addition, because lenders may not be concerned about the ratio until it exceeds the rule-of-thumb, PAY/Y is defined as zero until the ratio is greater than .25.

The dummy variable for bad credit history poses special problems. Without question the applicant's record of meeting obligations in the past is relevant in assessing the risk that the applicant may default on mortgage payments. Unfortunately, the available measure of credit history is not ideal. First, the many gradations from excellent to very poor have been collapsed to two, acceptable credit history or unacceptable. Second, information about credit history is available only for applications rejected. A third problem, of a different kind, is that the evaluation of credit history might itself reflect discriminatory thinking of loan officers. The measure available to this study is not a record of bankruptcy, defaults, or late payments on other loans, but only the lender's judgment of whether that record is acceptable or not. If one wanted to discriminate, asserting that the applicant had a bad credit history might be a convenient way to justify a rejection for the formal record.

Only if one believes that credit history can be divided into "acceptable" and "unacceptable," that no applicant with a credit history as poor as those judged "unacceptable" for other applicants has received a mortgage, and that the evaluation is not itself discriminatory will the dummy variable for credit be a proper measure. These are strong assump-

Table 5.1

Definitions of Variables Used in the Analysis of Denials

DENIED	Dummy variable (=1) if the application was denied
Proper Risk Measures	
BADCDT	Dummy variable (=1) if the application was rejected because of "unacceptable credit history"
RLN/V	Ratio of the requested loan amount to the appraised value of the property
PMI	Dummy variable (=1) for applications requesting private mortgage insurance
FHA-VA	Dummy variable (=1) for applications requesting Federal Housing Administration insurance or Veterans Administration guarantees
PAY/Y	Ratio of monthly payment (based on requested terms) to combined gross monthly income of applicant and co-applicant. Values less than .25 are redefined as 0.
PAY/Y2	PAY/Y squared.
$OB/Y	Ratio of monthly payment on existing debt to combined gross monthly income of applicant and co-applicant (existing debt excludes any mortgage payment that would cease if the application is approved)
Possibly Proper Risk Measures	
P5-10	Dummy variable (=1) for properties 5-10 years old
P10-25	Dummy variable (=1) for properties 10-25 years old
P25-50	Dummy variable (=1) for properties 25-50 years old
P50-75	Dummy variable (=1) for properties 50-75 years old
P>75	Dummy variable (=1) for properties more than 75 years old

Table 5.1 *(Continued)*

Definitions of Variables Used in the Analysis of Denials

2NDY/Y	Proportion of combined monthly income derived from the co-applicant
%BLACK	Percent black in census tract of property from 1970 Census
%SPAN	Percent Spanish-surnamed in census tract of property from 1970 Census
%OWNOC	Percent owner-occupied properties in census tract of property from 1970 Census
%<1939	Percent of properties in census tract in 1970 that were constructed before 1939
%<POV	Percent of households in 1970 with income below the official poverty level in 1970
NBH1-NBH29	Dummy variables (=1) for properties in the specified Toledo neighborhood. The omitted reference dummy variable is for the Toledo suburbs. A superscript 'R' indicates a neighborhood allegedly redlined or one having conditions consistent with neighborhoods allegedly redlined.
Improper Considerations	
BLACKS	Dummy variable (=1) for black applicants
HISPAN	Dummy variable (=1) for Spanish-American applicants
OTHRNW	Dummy variable (=1) if race is other than white, black, or Spanish-American
FEMALE	Dummy variable (=1) if applicant is female
UNMARR	Dummy variable (=1) if applicant is not married
AGE>65	Dummy variable (=1) if applicant is greater than 65 years old
Other Variables	
S&L1-S&L17	Dummy variable (=1) for each S&L in sample. Dummy for the largest S&L is omitted.

tions. Failure of the first two would mean that measurement error would bias the coefficient on the dummy variable toward zero. Failure of the third would mean that age, race, sex, marital status, or other sorts of discrimination might be concealed as a proper response to the applicant's alleged poor record.

Because of these problems the analysis in this section will present two separate equations for each SMSA, one with and one without the dummy variable for bad credit history. However, it is important not to dismiss the usefulness of the measure of bad credit history too readily, even though there are possible problems. If credit history is an important consideration in approving a mortgage application, an imperfect measure may be better than none at all. Suppose that some applicants who appear to be acceptable credit risks on all bases other than credit history in fact have a bad history and are rejected for that reason. If the equation is estimated without a measure of credit history, the application will appear to be rejected without explanation. If the credit history is uncorrelated with other explanatory variables, the exclusion of credit history will not bias the coefficients of the included variables, but the unexplained rejections will increase the standard error of the equation and decrease the t-values for each coefficient. To the extent the dummy variable for credit history is a good approximation to the true measure, including it in the equation should leave other coefficients unchanged but increase the precision of estimate, allowing a better assessment of their influence.

If the true measure of credit history is correlated with other variables in the equation, coefficients in the equation estimated without credit history will be biased. In particular, if credit history is correlated in the sample with variables denoting discrimination, omitting the measure may lead to a false conclusion that discrimination has occurred. Since the dummy variable is certainly correlated with the true measure, including it will remove at least some of the bias; moreover, by comparing coefficient changes between equations with and without the credit dummy variable it should be possible to surmise whether the absence of the true measure of credit history is causing a serious problem of bias. If there is little coefficient change, there should be little problem of bias.

The analysis in this section is based on mortgage applications received for the purchase, refinance, or construction with permanent financing of owner-occupied residential properties. Applications withdrawn before a decision and applications still pending in March 1979 are excluded. Applications missing any of the data used in the analysis are also omitted, except that the appraised value and purchase price are substituted for each other if one is missing. This substitution seems warranted since the analysis in the previous section found the mean ratio of the two variables to be very close to 1.0 and to have few significant

patterns. Table 5.2 compares selected characteristics of applicants used in the analysis with characteristics of applicants omitted because of missing data. There appear to be very few differences between observations omitted and used.

Estimated coefficients, with t-statistics in parentheses, for equation (1) are given in Table 5.3. For each SMSA column A reports results without the dummy variable for bad credit and column B reports results including it. The individual S&L dummies (S&L 1,. . .,S&L 17) refer, of course, to different S&Ls in each SMSA. In each SMSA the S&L coefficients are the values relative to the largest volume S&L, which has been omitted to avoid singularity. The neighborhood dummy variables are available only in the Toledo SMSA. All neighborhood dummy values are relative to a Toledo suburb.

Miami

The coefficients in column A for the dummy variables for blacks and Hispanics imply statistically significant discrimination against these applicants. Blacks are about 9 percentage points and Hispanics about 3 percentage points more likely to be denied than are comparable white applicants. Since the mean overall rate is about 9 percent, it appears that blacks are about twice as likely to be denied and Hispanics about one-third more likely. Including the dummy variable for bad credit in column B causes the coefficient for blacks to fall to statistical insignificance; the coefficients for Hispanics declines slightly but remains significant at the 5 percent level. Apparently, black applicants are more likely to be denied on the basis of a bad credit record; that evaluation may itself involve discrimination, as noted previously. Neither sex, marital status, nor age of applicant is an apparent basis for discrimination in column A; indeed the negative coefficient for applicants over 65 may imply some preference for them relative to applicants 35-55 years old. The results with credit history are the same except that the preference for older applicants is small and less significant and there is a marginally significant implication of discrimination against applicants under 25. It has been suggested that sex and marital status discrimination might be limited to single women. Estimates not reported revealed that a separate dummy variable for unmarried women was insignificant as was a dummy for unmarried women under 45.

The insignificant coefficients for 2NDY/Y implies that the income of a co-applicant is not discounted. If anything, the negative sign would suggest a preference for a two-income family, possibly because the income stream might be more stable. The coefficients for the age of house imply that denial is about 4 percentage points more likely for

Table 5.2

*Mean Values of Selected Characteristics of Applicants**

	Miami		San Antonio		Toledo	
	Omitted**	Used**	Omitted	Used	Omitted	Used
Age	44	43	37	36	35	34
Combined Gross Monthly Income	$3285	$3153	$2466	$2360	$2132	$2147
Sex (Percent Distribution)						
Male	84	86	86	91	90	91
Female	16	14	13	09	08	09
Unknown	01	00	02	00	01	00
Race (Percent Distribution)						
White	79	71	74	77	89	92
Black	03	03	01	01	03	06
Hispanic	12	24	20	20	01	01
Other/Unknown	06	02	05	02	08	01
Married (Percentage)	71	74	70	78	77	78
Number of Applications	1240	2736	367	555	787	1020

* "Applicants" are persons who requested a mortgage for purchase, refinance, or construction with permanent financing of an owner-occupied residential dwelling. Applications withdrawn or not acted upon by March 1979 are excluded.

** "Omitted" refers to observations not used bec use of missing data. "Used" refers to applications used in the subsequent analysis. The sum of "omitted" and "used" is not equal to the total applications received for loans on owner-occupied residential property shown in Table 4.2 because of the additional restrictions on purpose and exclusion of loans withdrawn or not acted on.

Table 5.3

Analysis of Application Denials
(OLS Results)

Independent Variables	Miami		San Antonio		Toledo	
	A	B	A	B	A	B
BADCDT		0.8671*		0.8920*		0.8511*
		(24.70)		(12.16)		(12.95)
RLN/V	0.1945*	0.1887*	0.2349*	0.2326*	0.2028*	0.1848*
	(6.73)	(7.23)	(2.88)	(3.22)	(3.27)	(3.23)
PMI	–0.0428*	–0.0400*	–0.0874*	–0.0695*	0.0107	0.0053
	(–2.94)	(–3.04)	(–3.80)	(–3.41)	(0.45)	(0.24)
FHA-VA	–0.0895*	–0.0914*	–0.1883*	–0.1863*	0.0771	0.0334
	(–2.27)	(–2.56)	(–1.75)	(–1.96)	(1.88)	(0.88)
P5-10	–0.0096	–0.0145	0.0423	0.0308	0.0282	0.0157
	(–0.61)	(–1.01)	(1.39)	(1.15)	(0.77)	(0.46)
P10-25	0.0051	–0.0138	0.0959*	0.0680*	–0.0081	–0.0148
	(0.37)	(–1.11)	(3.57)	(2.85)	(–0.29)	(–0.57)
P25-50	0.0303*	0.0173	0.0125	0.0098	0.0040	–0.0107
	(1.74)	(1.10)	(0.37)	(0.33)	(0.14)	(–0.41)

Table 5.3 *(Continued)*

Analysis of Application Denials
(OLS Results)

Independent Variables	Miami		San Antonio		Toledo	
	A	B	A	B	A	B
P50-75	0.0292	0.0406	−0.0172	0.0046	0.0318	0.0206
	(0.66)	(1.02)	(−0.25)	(0.07)	(1.00)	(0.70)
P>75	0.1658	0.1822			0.2175*	0.1743*
	(1.22)	(1.48)			(5.06)	(4.38)
PAY/Y	0.4565*	0.5019*	0.4827	1.0165	−0.4296	−0.4497
	(4.21)	(5.12)	(0.52)	(1.25)	(−1.34)	(−1.52)
PAY/Y2	−0.5659*	−0.6104*	−0.0816	−2.1315	2.4600*	2.4537*
	(−2.82)	(−3.37)	(−0.03)	(−0.81)	(3.10)	(3.35)
$OB/Y	0.3124*	0.3007*	0.2316*	0.2257*	0.2832*	0.2888*
	(6.09)	(6.49)	(2.50)	(2.76)	(3.19)	(3.53)
BLACKS	0.0778*	0.0377	0.0190	−0.0048	0.1343*	0.0917*
	(2.23)	(1.20)	(0.19)	(−0.05)	(2.92)	(2.15)
HISPAN	0.0281*	0.0217*	0.0610*	0.0422*	0.1043	0.0186
	(1.98)	(1.69)	(2.29)	(1.79)	(1.15)	(0.22)

Table 5.3 *(Continued)*

Analysis of Application Denials
(OLS Results)

Independent Variables	Miami		San Antonio		Toledo	
	A	B	A	B	A	B
OTHRNW	0.0136	0.0183	−0.0394	−0.0327	−0.0253	−0.0062
	(0.40)	(0.59)	(−0.61)	(−0.57)	(−0.31)	(−0.08)
FEMALE	0.0059	0.0063	−0.0501	−0.0260	0.0263	0.0300
	(0.33)	(0.39)	(−1.29)	(−0.75)	(0.79)	(0.97)
UNMARR	0.0018	−0.0023	0.0234	0.0150	−0.0242	−0.0202
	(0.11)	(−0.17)	(0.79)	(0.57)	(−0.96)	(−0.86)
AGE<25	0.0213	0.0309	0.0380	0.0246	0.0266	0.0310
	(0.93)	(1.49)	(1.18)	(0.86)	(1.05)	(1.33)
A25-35	0.0051	0.0052	0.0068	−0.0040	−0.0188	−0.0144
	(0.40)	(0.46)	(0.31)	(−0.21)	(−0.92)	(−0.76)
A55-65	−0.0052	−0.0008	−0.0579	−0.0426	−0.0001	0.0085
	(−0.31)	(−0.05)	(−1.20)	(−1.00)	(−0.00)	(0.20)
AGE>65	−0.0415	−0.0344	0.0045	−0.0317	−0.0261	0.0218
	(−0.77)	(−1.63)	(0.07)	(−0.54)	(−0.29)	(0.26)

Table 5.3 *(Continued)*

Analysis of Application Denials
(OLS Results)

Independent Variables	Miami		San Antonio		Toledo	
	A	B	A	B	A	B
2NDY/Y	−0.0238	−0.0283	−0.0195	0.0062	−0.0610	−0.0576
	(−0.81)	(−1.07)	(−0.38)	(0.14)	(−1.30)	(−1.33)
%BLACK	0.0007	0.0006	0.0034*	0.0004	−0.0002	0.0005
	(1.26)	(1.29)	(1.97)	(0.27)	(−0.14)	(0.34)
%SPAN	0.0010*	0.0009	0.0008	0.0010	0.0039	−0.0036
	(1.67)	(1.62)	(0.74)	(1.13)	(0.41)	(−0.41)
%OWNOC	0.0002	0.0001	0.0004	0.0003	0.0018	0.0009
	(0.71)	(0.23)	(0.57)	(0.41)	(1.43)	(0.82)
%<1939	−0.0006	−0.0006	0.0009	0.0015*	0.0003	0.0005
	(−0.98)	(−1.07)	(1.11)	(1.96)	(0.42)	(0.71)
%<POV	0.0023*	0.0024*	0.0016	−0.0017	0.0043	0.0017
	(1.84)	(2.10)	(0.64)	(−0.77)	(1.58)	(0.68)
S&L i	−0.0711*	−0.0639*	0.0976*	0.0986*	−0.0235	−0.0073
	(−2.65)	(−2.63)	(2.15)	(2.46)	(−0.39)	(−0.13)

Table 5.3 *(Continued)*

Analysis of Application Denials
(OLS Results)

Independent Variables	Miami		San Antonio		Toledo	
	A	B	A	B	A	B
S&L 2	−0.0009	−0.0029	0.0167	−0.0049	0.2784*	0.2780*
	(−0.05)	(−0.18)	(0.57)	(−0.19)	(2.89)	(3.12)
S&L 3	−0.0879*	−0.0683*	0.0005	−0.0141	0.0056	0.0063
	(−4.86)	(−4.18)	(0.02)	(−0.59)	(0.09)	(0.11)
S&L 4	0.0518*	0.0090	−0.0112	−0.0251	0.1046	0.0351
	(2.10)	(0.40)	(−0.37)	(−0.93)	(1.30)	(0.47)
S&L 5	−0.0354	−0.0223	−0.0026	0.0487	0.1843*	0.1784
	(−1.49)	(−1.04)	(−0.04)	(0.87)	(6.39)	(6.71)
S&L 6	0.0655*	0.0729*	0.1263	0.1403	0.0226	0.0260
	(2.95)	(3.64)	(1.35)	(1.70)	(0.93)	(1.17)
S&L 7	−0.0882*	−0.0680*	−0.0538	−0.0580	0.0861*	0.0764*
	(−3.90)	(−3.33)	(−0.63)	(−0.77)	(2.40)	(2.30)
S&L 8	−0.0816*	−0.0732*	0.1308*	0.1338*	−0.0470	−0.0401
	(−2.42)	(−2.40)	(2.62)	(3.03)	(−0.43)	(−0.40)

Table 5.3 *(Continued)*

Analysis of Application Denials
(OLS Results)

Independent Variables	Miami		San Antonio		Toledo	
	A	B	A	B	A	B
S&L 9	−0.0793	−0.0591	−0.0628	−0.0167	0.1429	0.0608
	(−1.68)	(−1.38)	(−1.03)	(−0.31)	(1.52)	(0.70)
S&L 10	−0.0568*	−0.0511*			−0.0245	−0.0175
	(−2.04)	(−2.04)			(−0.70)	(−0.54)
S&L 11	0.0134	0.0411				
	(0.36)	(1.24)				
S&L 12	−0.1229	−0.0902				
	(−1.34)	(−1.09)				
S&L 13	−0.1203	−0.0870				
	(−0.98)	(−0.79)				
S&L 14	−0.0960	−0.0745				
	(−1.11)	(−0.95)				
S&L 15	−0.0301	−0.0376				
	(−0.52)	(−0.73)				

Table 5.3 *(Continued)*

Analysis of Application Denials
(OLS Results)

Independent Variables	Miami		San Antonio		Toledo	
	A	B	A	B	A	B
S&L 16	−0.0623	−0.0818				
	(−0.93)	(−1.35)				
NBH 1[R]					−0.1134	−0.0862
					(−1.15)	(−0.95)
NBH 2[R]					−0.0338	−0.0636
					(−0.41)	(−0.83)
NBH 3					−0.1179	−0.1111
					(−1.23)	(−1.25)
NBH 4					0.0367	0.0363
					(0.72)	(0.77)
NBH 5[R]					−0.0586	−0.0381
					(−0.97)	(−0.69)
NBH 6					−0.2595	−0.1798
					(−1.62)	(−1.22)

Table 5.3 *(Continued)*

Analysis of Application Denials
(OLS Results)

Independent Variables	Miami		San Antonio		Toledo	
	A	B	A	B	A	B
NBH 7[R]					−0.2566	−0.3335*
					(−1.86)	(−2.62)
NBH 8[R]					−0.0018	−0.0057
					(−0.03)	(−0.10)
NBH 9					0.1003	0.0552
					(0.92)	(0.55)
NBH 10					0.0381	0.0667
					(0.65)	(1.23)
NBH 11					−0.0601	−0.0719
					(−0.69)	(−0.90)
NBH 12					0.0595	0.0367
					(0.92)	(0.62)
NBH 13					0.0721	0.0569
					(1.16)	(0.99)

Table 5.3 *(Continued)*

Analysis of Application Denials
(OLS Results)

Independent Variables	Miami		San Antonio		Toledo	
	A	B	A	B	A	B
NBH 14					0.0136	0.0138
					(0.36)	(0.39)
NBH 15					0.0194	0.0385
					(1.21)	(0.55)
NBH 18[R]					–0.0393	–0.0451
					(–0.48)	(–0.60)
NBH 19[R]					–0.0585	–0.1486
					(–0.57)	(–1.55)
NBH 20					–0.0916	–0.0831
					(–1.50)	(–1.48)
NBH 21					0.0038	0.0001
					(0.08)	(0.00)
NBH 22					–0.1284	–0.1152
					(–1.24)	(–1.20)

Table 5.3 *(Continued)*

Analysis of Application Denials
(OLS Results)

Independent Variables	Miami		San Antonio		Toledo	
	A	B	A	B	A	B
NBH 23					0.0224	0.0193
					(0.37)	(0.35)
NBH 24					0.0293	0.0227
					(0.59)	(0.50)
NBH 25					0.0523	−0.0231
					(0.93)	(−0.44)
NBH 26					−0.0047	−0.0127
					(−0.06)	(−0.17)
NBH 27					−0.0158	−0.0077
					(−0.36)	(−0.19)
NBH 28					−0.0056	−0.0128
					(−0.04)	(−0.10)
NBH 29					0.0548	0.0481
					(1.12)	(1.06)
Intercept	−0.1729*	−0.1669*	−0.3239*	−0.2747*	−0.3621*	−0.2554*
	(−4.39)	(−4.69)	(−3.31)	(−3.18)	(−2.81)	(−2.15)

Table 5.3 *(Continued)*

Analysis of Application Denials
(OLS Results)

Independent Variables	Miami		San Antonio		Toledo	
	A	B	A	B	A	B
Dependent Variable	DENIED	DENIED	DENIED	DENIED	DENIED	DENIED
Mean Value of Dependent Variable	0.0885	0.0885	0.0559	0.0559	0.0833	0.0833
Number of Observations	2733	2733	555	555	1020	1020
Adjusted R^2	0.0888	0.2570	0.1301	0.3216	0.1325	0.2613
S. E. E.	0.2712	0.2449	0.2144	0.1893	0.2576	0.2377

t-values in parentheses.
* Indicates significance at the 5 percent level or greater. One-tail tests are applied where appropriate.

houses 25-50 years old than for new houses. Denials do not seem to be more likely for houses older than this; however, less than 2 percent of the sample is more than 50 years old. Three of the 1970 census tract averages are significant at about the 10 percent level. Coefficients for the %BLACK and %SPAN variables imply that applications from areas about 50 percent of either minority would be about 5 percentage points more likely to be denied. Applications from areas where 50 percent of the residents had a 1970 income below the official poverty level would be about 10 percentage points more likely to be denied. These results confirm that location matters to the lender. Unfortunately, there is no way to say whether this implies geographical discrimination or "redlining" because there is no evidence about the changes in neighborhood property values that would be proper measures of risk.

Coefficients for the measures or risk and underwriting standards are all significant with the expected signs. Denial increases with increasing loan/value, decreases when FHA-VA or PMI is requested, increases with higher payment/income, and increases with higher existing monthly debt payments/income. In column B the dummy variable for bad credit is highly significant.[7]

Comparing the coefficients for "proper business considerations" in columns A and B shows that the effect of including the bad credit dummy is to increase the statistical significance with little change in point estimates. This result is of considerable importance. It implies that the credit history is an independent consideration to the lender. Therefore, it is probably *not* true that from a group of applicants with poor credit records, some will be approved and others denied on the basis of considerations like requested loan/value, payment/income, or monthly debt/income. Rather, it suggests that lenders first screen on credit history; applicants who fail that are considered no further.[8] Applicants with acceptable credit records may still be denied on the basis of other risk measures, but their credit records will play little role in the outcome. This reasoning leads to the conclusion that the dummy variable for credit history probably is not much impaired by measurement error.

A number of the dummy variables for individual S&Ls are significant both with and without the inclusion of the bad credit dummy. Estimates for other coefficients, in particular the age, race, sex, and marital status of the applicant, are unaffected by the S&L dummies.

San Antonio

In general the results for San Antonio are quite similar to those for Miami. Neither the age, sex, nor marital status of the applicant

[7]It is useful to know that only 18 percent of denials are based on bad credit.
[8]Some lenders state explicitly that this is their practice.

is associated with significantly higher frequency of denial. (Separate dummy variables for unmarried women less than 45 were also insignificant in results not presented.) Hispanic applicants are about 5 percentage points more likely to be denied than whites; this is about twice the overall mean of .056. The coefficient for black applicants is based on only 10 cases and should be ignored.

Referring to the "possibly proper considerations," one sees that second incomes do not appear to be discounted. Applications for houses 10-25 years old are significantly more likely to be denied; but, inexplicably, denial rates for houses older than 25 years are not greater than for new ones. The coefficients on the location variables are either insignificant or unstable between columns A and B.

Coefficients for the "proper business considerations" are mostly significant and similar in size to those in Miami. The ratio of proposed monthly payment to income, however, is insignificant. As in Miami, the dummy variable for bad credit is highly significant in column B.[9] Point estimates for the other "proper" variables are nearly unchanged between A and B, but the standard errors are smaller in B, making t-values larger.

A few of the dummy variables for individual S&Ls are significant. Including them does not affect estimates for the other coefficients.

Toledo

Except for applicants less than 25 years old, there is no evidence that age, sex, or marital status affects the likelihood of denial. Applicants less than 25 appear to be about 3 percentage points more likely to be denied than would a comparable applicant 35-55 years old. The denial rate for black applicants is about 10 percentage points higher than for white applicants and is highly significant. This implies a denial rate for black applicants more than twice the overall rate of .08. The Hispanic coefficient is based on only 9 applications and should be ignored.

The age of the dwelling unit is unrelated to denial, except for properties more than 75 years old, where the coefficient is large and highly significant. Nearly 7 percent of the houses are in this category. As in Miami, the income of a co-applicant does not appear to be discounted; the negative coefficient, significant at about the 20 percent level, is consistent with a preference for multiple income households. None of the census tract variables is significant.

The various "proper business considerations" are mostly

[9]In San Antonio 25 percent of denials were for bad credit history.

significant with the anticipated signs. The exceptions are the dummies for PMI and FHA-VA which are positive instead of negative. As in the other SMSAs adding the dummy variable for bad credit to the equation generally increases the significance of the variables but leaves their point estimates unchanged.

The most valuable results from the Toledo equations may be the evidence regarding geographical discrimination or redlining. There have been repeated charges of redlining in Toledo; several recent studies have examined lending patterns, but none have had data as appropriate and detailed as those used in this study.[10] As explained in Section 3 this study has divided the Toledo area into neighborhoods that are census tract approximations to the neighborhoods identified by the Toledo city government. The coefficients for the 29 neighborhood dummy variables represent the likelihood of denial for an application from these areas relative to an application from the general Toledo suburban area. The reader will observe that no neighborhood coefficient is significantly positive, implying that, other things equal, mortgage applications on properties in Toledo neighborhoods are no more likely to be denied than they would if the property were in a suburb. This is the best evidence in this study on the question of redlining by lenders. The unusual data available for analysis here give this finding particular importance, since most other redlining studies have been seriously flawed.[11]

The absence of evidence supporting redlining allegations in Toledo does not conclusively demonstrate that redlining does not occur. In particular, there are too few observations in some neighbohoods that might be redlined to permit analysis of those areas. (This might be interpreted as evidence of redlining by prescreening.) Note that dummy variables for neighborhoods 16 and 17, known respectively as Warren-Sherman and Roosevelt, are omitted for this reason. Both of these are older, central city areas with heavily black populations. The lack of observations is not the entire explanation for the apparent lack of redlining, however, as neighborhood 7 (Nebraska) is also central city, older, and heavily black. There are sufficient observations to analyze the rate of denial there, and it is not significantly higher. Indeed, after allowing for the credit record of applicants, the likelihood of denial is significantly *lower*. In sum, the evidence here does not support allegations of redlining, in the sense that applications filed are differentially treated according to the location of the property, but it does not exclude redlining, in the sense that somehow applications from certain areas are prevented.

[10]Hutchinson, Ostas, and Reed (1978).

[11]See King (1979) and Benston (1979) for a review of redlining studies. Schafer (1978) and Schafer and Ladd (1980) have studied mortgage discrimination in New York and California using data similar to those used in this study. Benston, Horsky, and Weingartner (1978) have completed an excellent study of lending in Rochester, N.Y.

Summary

The evidence from all three SMSAs is much the same. There is little evidence that denial of a mortgage application is related to the age, sex, or marital status of the applicant. However, the likelihood of denial is significantly higher for black or Hispanic applicants, from 30 to more than 100 percent greater. The suggestion of racial discrimination is an important finding, especially if it can be confirmed by a subsequent examination of the actual loan application files of minority applicants. The information available to this study is not sufficient to demonstrate discrimination, only to raise a strong suspicion. It is important, nevertheless, to emphasize that most applicants, minority or non-minority, receive the loan requested. Even if rejection rates for blacks or Hispanics are 30 to 100 percent greater, it remains true that 85 to 90 percent of minority applications are approved. This perspective should in no way be considered to condone discrimination, but it does permit a better appreciation of the size of the problem.

Property age has a somewhat erratic relationship to denial. In Toledo only extreme age seems to matter, but in Miami and San Antonio intermediate ages are significant, while neither lesser nor greater age matters. The various "proper business considerations," intended to represent risk of default and amount of protection from loss, are generally highly significant with the expected signs. Judging from the effects on other "proper" variables, the possible problems identified in using the dummy variable for bad credit are actually minimal. The evidence on geographical discrimination or redlining is of particular interest because the data available to this study are more appropriate than most other studies have had. This study finds no evidence that properties in Toledo neighborhoods are more likely to be denied mortgages than would properties in suburban Toledo.

VI. Mortgage Terms on Approved Applications

This section uses two-stage least squares (2SLS) regression to analyze loan terms on approved applications for evidence of discrimination related to the age, race, sex, or marital status of the applicant, or to the location of the property. As explained in Section 2, the two basic assumptions of the analysis are (1) that approval of an application is a sequential process in which the application is first approved or rejected and thereafter specific terms are set for approved applications, and (2) that the terms offered are interrelated. The interest rate, term-to-maturity, and loan-to-value ratio jointly determine the lender's risk and the reward for taking it.

The specification of the equation for each mortgage term is given in equations (2), (3), and (4). Variables are defined in Table 6.1 and are divided into "proper," "possibly proper," and "improper" considerations as in Section 4. Requested mortgage terms are regarded as predetermined variables. Equation (2) assumes that the requested mortgage rate plays no direct role in setting the approved rate, rather this is heavily dependent on the market rate of interest represented by a simple time trend.[12] ATERM and AL/V are treated as endogenous influences on the mortgage rate. ALOAN, also endogenous, is included because fixed transaction costs permit slightly lower rates on large mortgages than on small ones.

$$\begin{aligned} AROI = f_r\,(&PMI, FHA\text{-}VA, \text{Age of property (dummy variables)}, \\ &\$OB/Y, TIME, BLACKS, HISPAN, OTHRNW, \\ &FEMALE, UNMARR, \text{Age of applicant (dummy} \\ &\text{variables)}, 2NDY/Y, \%BLACK, \%HISPAN, \%OWNOC, \\ &\%<1939, \%<POV, S\&L \text{ dummies}, ATERM, AL/V, \\ &ALOAN) + \mu^r \end{aligned} \tag{2}$$

$$\begin{aligned} ATERM = f_t\,(&RTERM, PMI, FHA\text{-}VA, \text{Age of property (dummy} \\ &\text{variables)}, \$OB/Y, BLACKS, HISPAN, OTHRNW, \\ &FEMALE, UNMARR, \text{Age of applicant (dummy} \\ &\text{variables)}, 2NDY/Y, \%BLACK, \%HISPAN, \\ &\%OWNOC, \%<1939, \%<POV, S\&L \text{ dummies}, AROI, \\ &AL/V) + \mu^t \end{aligned} \tag{3}$$

[12]Over the period studied the average mortgage rate on existing homes rose fairly steadily from 9.70 in September 1978 to 10.26 in March 1979.

$$AL/V = f_1 (RL/V, PMI, FHA\text{-}VA, \text{Age of property (dummy variables)}, \$OB/Y, BLACKS, HISPAN, OTHRNW, FEMALE, UNMARR, \text{Age of applicant (dummy variables)}, 2NDY/Y, \%BLACK, \%HISPAN, \%OWNOC, \%<1939, \%<POV, S\&L \text{ dummies}, AROI, ATERM) + \mu^1 \quad (4)$$

The specification of the equations for the term-to-maturity and loan-to-value assume that requested terms do affect the terms offered, since some applicants genuinely want shorter-term mortgages and commonly have a strong preference for a particular loan-to-value ratio. Each equation treats the other two mortgage terms as endogenous.

The data bases used in this section consist of all applications approved in each SMSA for the purchase or refinance of owner-occupied residential properties or construction with permanent financing of such properties. Applications with missing data have been omitted.[13] Table 6.2 presents selected characteristics of observations used and omitted from the analysis. There is little evidence of any important differences.

Miami

Estimated coefficients for the three mortgage terms are given in Table 6.3. From column 1 it appears that market interest rates, represented by the time trend, and use of PMI or FHA-VA insurance are highly significant influences on the mortgage rate. As anticipated, the interest rate declines as the loan size increases, possibly reflecting transaction economies. The interest rate increases with the loan/value, which is reasonable since the risk of default also increases. The negative coefficient on ATERM implies lower rates on longer-term loans. This result is consistent with the view that the risk of default is lower on long-term loans because the monthly payments are lower. It is inconsistent with the view that the risk to collateral is greater over the longer term, making the loan less well secured. There is no implication that the rate of interest increases with the age of the building and only a weak suggestion that the proportion of income from the co-applicant is an influence.

For present purposes the most important results are that the age, race, sex, and marital status of the applicant have very slight effects on the mortgage rate, if any at all. The rate is never changed by as much as 3 basis points, and the coefficients are usually insignificantly different from zero.[14]

[13]The instructions for data collection inadvertently resulted in failure to record terms offered on approved mortgages if the applicant did not accept the offer. This should not be a source of bias, since very few applicants actually declined a mortgage offer.

[14]One specification not reported here distinguished unmarried female applicants from others and found the dummy variable to have a positive coefficient of .026 with a t-value of 2.24. This is significant but still quite small.

Table 6.1

Definitions of Variables Used in the Analysis of Mortgage Terms

Loan Terms	
AROI	Mortgage rate on approved loans in percent
ATERM	Mortgage term-to-maturity on approved loans in months
AL/V	Ratio of the approved loan amount to the appraised value
ALOAN	Amount of the approved loan
RTERM	Requested mortgage term-to-maturity in months
RL/V	Ratio of the requested loan amount to the appraised value
TIME	Daily time trend representing market interest rates 1 September 1979 = 1
Proper Risk Measures	
PMI	Dummy variable (=1) for applications requesting private mortgage insurance
FHA-VA	Dummy variable (=1) for applications requesting Federal Housing Administration or Veterans Administration insurance
$OB/Y	Ratio of monthly payment on existing debt to combined gross monthly income of applicant and co-applicant (existing debt excludes any mortgage payment that would cease if the application is approved)
Possibly Proper Risk Measures	
P5-10	Dummy variable (=1) for properties 5-10 years old
P10-25	Dummy variable (=1) for properties 10-25 years old
P25-50	Dummy variable (=1) for properties 25-50 years old
P50-75	Dummy variable (=1) for properties 50-75 years old
P>75	Dummy variable (=1) for properties more than 75 years old
2NDY/Y	Proportion of combined gross monthly income derived from the co-applicant

Table 6.1 *(Continued)*

Definitions of Variables Used in the Analysis of Mortgage Terms

%BLACK	Percent black in census tract of property from 1970 Census
%SPAN	Percent Spanish-surnamed in census tract of property from 1970 Census
%OWNOC	Percent owner-occupied properties in census tract of property from 1970 Census
%<1939	Percent of properties in 1970 in census tract which were constructed before 1939
%<POV	Percent of households in 1970 with income below the official poverty level in 1970
NBH1-NBH29	Dummy variables (=1) for properties in the specified Toledo neighborhood. The omitted reference dummy variable is for the Toledo suburbs. A superscript 'R' indicates a neighborhood allegedly redlined or one having conditions consistent with neighborhoods allegedly redlined.
Improper Considerations	
BLACKS	Dummy variable (=1) for black applicants
HISPAN	Dummy variable (=1) for Spanish-American applicants
OTHRNW	Dummy variable (=1) if race is other than white, black, or Spanish-American
FEMALE	Dummy variable (=1) if applicant is female
UNMARR	Dummy variable (=1) if applicant is not married
AGE<25	Dummy variable (=1) if applicant is less than 25 years old
A25-35	Dummy variable (=1) if applicant is 25-35 years old
A55-65	Dummy variable (=1) if applicant is 55-65 years old
AGE>65	Dummy variable (=1) if applicant is greater than 65 years old
Other Considerations	
S&L1-S&L17	Dummy variable (=1) for each S&L in sample. Dummy for the largest S&L is omitted

Table 6.2

Mean Values of Selected Characteristics of Approved Applicants*

	Miami		San Antonio		Toledo	
	Omitted**	Used**	Omitted	Used	Omitted	Used
Age	45	43	37	36	35	34
Combined Gross Monthly Income	$3388	$3179	$2659	$2409	$2191	$2177
Sex (Percent Distribution)						
Male	82	86	86	90	91	91
Female	18	14	12	10	08	09
Unknown	00	00	02	00	01	00
Race (Percent Distribution)						
White	81	72	74	78	89	93
Black	02	02	01	01	02	05
Hispanic	12	23	20	19	01	01
Other/Unknown	06	02	05	02	08	01
Married (Percentage)	71	74	73	78	79	79
Number of Applications	826	2130	247	510	639	901

* "Approved Applicants" are persons approved for a mortgage for the purchase, refinance, or construction with permanent financing of an owner-occupied residential dwelling.
** "Omitted" refers to applications not used in the subsequent analysis because of missing data. "Used" refers to applications used in the analysis.

Table 6.3

Miami — Analysis of Mortgage Terms on Approved Applications
(Two-Stage Least Squares Results)

Dependent Variable:	AROI	ATERM	ATERM	AL/V
Independent Variables				
RTERM		0.8729*		
		(106.24)		
RL/V				0.9133*
				(126.50)
PMI	0.0890*	0.4417	−3.2818*	0.0090*
	(8.60)	(0.72)	(−2.12)	(3.57)
FHA-VA	−0.1539*	0.9154	2.4991	0.0110
	(−5.66)	(0.59)	(0.63)	(1.70)
P5-10	0.0095	−0.7579	−4.9985*	−0.0091*
	(0.90)	(−1.25)	(−3.25)	(−3.58)
P10-25	0.0129	−0.4620	−6.4333*	−0.0063*
	(1.36)	(−0.85)	(−4.70)	(−2.78)
P25-50	0.0064	−3.7452*	−12.0502*	−0.0085*
	(0.52)	(−5.28)	(−6.73)	(−2.87)
P50-75	0.0257	−8.2523*	−14.4743*	−0.0254*
	(0.79)	(−4.40)	(−3.04)	(−3.25)
$OB/Y	−0.0353	−2.5821	0.2740	0.0187*
	(−1.02)	(−1.29)	(0.05)	(2.25)
TIME	0.0009*			
	(7.29)			
BLACKS	0.0182	−0.1852	−7.3625*	−0.0025
	(0.73)	(−0.13)	(−2.02)	(−0.42)
HISPAN	−0.0035	−0.2565	1.2792	−0.0004
	(−0.36)	(−0.46)	(0.90)	(−0.17)
OTHRNW	−0.0049	0.3179	4.0967	0.0040
	(−0.21)	(0.23)	(1.19)	(0.70)
FEMALE	0.0143	−0.8009	0.4901	−0.0057*
	(1.17)	(−1.14)	(0.27)	(−1.95)
UNMARR	0.0156	0.1040	0.1318	0.0028
	(1.47)	(0.17)	(0.08)	(1.09)
AGE<25	−0.0228	0.2692	1.3608	0.0032
	(−1.45)	(0.30)	(0.59)	(0.85)
A25-35	0.0040	0.1155	1.5408	0.0029
	(0.46)	(0.23)	(1.21)	(1.37)

t-values in parentheses.
* Indicates significance at the 5 percent level or greater. One-tail tests are applied where appropriate.

Table 6.3 *(Continued)*

Miami — Analysis of Mortgage Terms on Approved Applications
(Two-Stage Least Squares Results)

Dependent Variable:	AROI	ATERM	ATERM	AL/V
A55-65	0.0116	0.1183	−0.9201	−0.0066*
	(1.02)	(0.18)	(−0.55)	(−2.42)
AGE>65	0.0290*	0.1819	−1.1122	−0.0057
	(1.89)	(0.21)	(−0.50)	(−1.57)
2ND/Y	0.0318	1.4511	2.9998	0.0037
	(1.58)	(1.26)	(1.02)	(0.77)
%BLACK	−0.0007*	−0.0034	−0.1700*	0.0001
	(−1.86)	(−0.15)	(−3.00)	(0.78)
%HISPAN	0.0011*	0.0042	0.0083	0.0001
	(2.57)	(0.17)	(0.14)	(1.18)
%OWNOC	−0.0013*	0.0068	−0.0120	0.0001*
	(−6.92)	(0.60)	(−0.42)	(2.20)
%<1939	−0.0013*	−0.0147	−0.0939	0.0001
	(−2.88)	(−0.58)	(−1.45)	(1.02)
%<POV	0.0014	0.0303	0.0991	−0.0002
	(1.61)	(0.61)	(0.78)	(−1.09)
S&L 1	−0.0380*	−4.0553*	−18.1359*	−0.0142*
	(−2.18)	(−4.05)	(−7.19)	(−3.37)
S&L 2	−0.0370*	−0.2544	−1.1584	−0.0048
	(−3.05)	(−0.36)	(−0.65)	(−1.64)
S&L 3	−0.0446*	−0.1398	−2.8300	0.0006
	(−3.58)	(−0.20)	(−1.57)	(0.20)
S&L 4	−0.0124	−0.8090	−7.7261*	0.0002
	(−0.66)	(−0.75)	(−2.83)	(0.03)
S&L 5	−0.0174	1.0311	1.4925	−0.0068
	(−1.11)	(1.14)	(0.65)	(−1.82)
S&L 6	0.0017	−3.3217*	−9.1237*	−0.0083*
	(0.11)	(−3.75)	(−4.07)	(−2.24)
S&L 7	−0.0599*	0.7225	2.8417	0.0025
	(−4.06)	(0.85)	(1.31)	(0.70)
S&L 8	−0.1633*	−1.6804	−15.9112*	0.0047
	(−7.76)	(−1.36)	(−5.09)	(0.90)
S&L 9	−0.0005	−4.9607*	−13.8030*	−0.0016
	(−0.02)	(−2.75)	(−3.02)	(−0.21)
S&L 10	0.0280	0.5618	0.4857	−0.0099*
	(1.46)	(0.51)	(0.17)	(−2.14)

t-values in parentheses.
* Indicates significance at the 5 percent level or greater. One-tail tests are applied where appropriate.

Table 6.3 *(Continued)*

Miami — Analysis of Mortgage Terms on Approved Applications
(Two-Stage Least Squares Results)

Dependent Variable:	AROI	ATERM	ATERM	AL/V
S&L 11	−0.0137 (−0.53)	−1.6902 (−1.13)	−10.7243* (−2.82)	−0.0093 (−1.49)
S&L 12	−0.0975 (−1.66)	−13.3594* (−3.95)	−32.5822* (−3.80)	0.0024 (0.17)
S&L 13	−0.0343 (−0.42)	−12.6356* (−2.68)	−31.8874* (−2.66)	−0.0194 (−0.98)
S&L 14	−0.0380 (−0.73)	−3.3049 (−1.10)	−17.9573* (−2.36)	−0.0140 (−1.12)
S&L 15	0.0955* (2.29)	−4.1580 (−1.73)	1.4381 (0.24)	−0.0072 (−0.72)
S&L 16	−0.0454 (−1.02)	−8.2222* (−3.21)	−10.5717 (−1.62)	−0.0012 (−0.11)
AROI		−0.3143 (−0.21)	−7.2919 (−1.95)	0.0254* (4.17)
ATERM	−0.0003* (−1.66)			0.0001 (1.89)
AL/V	0.3812* (12.12)	1.3942 (0.74)	52.4337* (11.29)	
ALOAN	−0.0004* (−2.10)			
Intercept	9.4177* (156.85)	46.5984* (3.27)	379.0139* (10.73)	−0.2123* (−3.57)
Mean Value of Dependent Variable	9.5851	341.8366	341.8366	0.7734
Number of Observations	2130	2130	2130	2130
Adjusted R^2	0.2365	0.8673	0.1445	0.9271
S. E. E.	0.1616	9.3419	23.7189	0.0389

t-values in parentheses.
* Indicates significance at the 5 percent level or greater. One-tail tests are applied where appropriate.

The census tract variables are all significant, but in two cases the signs are unexpected. Interest rates are significantly lower in black areas and lower in areas with a large proportion of older houses. These results are contrary to the common predictions about "redlining." Interest rates are higher in Hispanic areas and lower in areas with much owner-occupied housing.

In column 2 it appears that the requested term is by far the most significant influence on the term approved. Except for some of the S&L dummy variables, the only significant influences are the age of the property: terms are significantly shorter, on average, for houses over 25 years old.

Since there can be reasonable doubt whether the requested term is actually a true, independent measure of the applicant's preferences, equation (3) has been re-estimated without the requested term. The results are given in column 3. The mortgage term approved for black applicants is significantly, but not greatly shorter. None of the other race, sex, age of applicant, or marital status dummy variables is significant. The percentage black is negative and highly significant, but none of the other census tract variables is.

Column 4 contains the estimated coefficients for the loan/value equation. As would be expected, the requested loan/value ratio is the most significant influence on the ratio approved. A number of the other variables are significant, indicating, for example, that the ratio is lower on older homes and for older applicants. The race of the applicant and the racial composition of the area are apparently insignificant as is the applicant's marital status. Female applicants, however, receive a lower loan/value ratio. The ratio of monthly obligations to income is a positive significant influence on the ratio. This result seems to reflect a consistent attitude toward debt finance on the part of applicants. It is somewhat puzzling, however, that the other mortgage terms are unrelated to the ratio of debt to income; presumably there would be greater risk in lending to someone who already carries a heavy burden of debt service.

The most striking result in column 4 is probably not the significance of particular variables but instead the remarkably small size of the coefficients. The largest coefficient (in absolute value) on a dummy variable is .025. Given this, it is impossible to avoid the conclusion that applicant, property, and locational characteristics cause, on average, no economically meaningful variation in the loan/value ratio from what the applicant requests.

San Antonio

Estimated coefficients for the three mortgage terms are given in Table 6.4. The interest rate equation is generally similar to that for Miami; however, a usury ceiling of 10 percent has apparently had an effect. Compared with Miami the mean interest rate is higher, but the time trend is smaller and less significant. The average U.S. contract interest rate on mortgages for existing homes did not exceed 10 percent until January 1979,[15] later than most commitments for applications in this sample. The apparent influence of the usury ceiling is therefore consistent with previous suggestions that usury ceilings affect mortgage commitments even before the ceiling would be exceeded.

Neither the age, race, sex, nor marital status of the applicant nor the presence of a co-applicant's income is related significantly to mortgage rate variations. Compared with rates on new houses, mortgage rates on existing houses are about .03 higher, but the difference is not significant for houses older than 50 years. The census tract variables imply that rates are, if anything, lower in areas with concentrations of blacks or Hispanics and decline with the average age of houses in the tract. Rates are estimated to increase with the proportion of owner occupancy. The effect is small, but if owner occupancy reduces risk by promoting stability the effect should be the reverse. Particularly in San Antonio, which has grown very rapidly since 1970, the use of decade-old data should be regarded sceptically; these generally insignificant or perverse results may simply underline that warning.

Columns 2 and 3 contain estimates for the term-to-maturity equations. When the specification includes the requested term, no other variables are large enough to be economically meaningful and few are statistically significant. Without the requested term-to-maturity it appears that Hispanics and applicants 55–65 receive shorter than expected terms. Mortgages on houses 10–50 years old are also shorter. The census tract variables imply shorter terms in black, Hispanic, and older areas — which would be consistent with redlining — but also in areas with high rates of owner occupancy — which is unexpected. Again, it should be emphasized that census data are now 10 years old, and San Antonio has grown rapidly over this period.

The approved loan/value is determined essentially by the requested ratio. As in Miami, other variables are either insignificant or imply so little variation as to be economically trivial.

[15]Table S.5.2. "Terms on Conventional Home Mortgage Loans Made: National Averages for Savings and Loan Associations" FHLBB *Journal*, October, 1979.

Table 6.4

San Antonio — Analysis of Mortgage Terms on Approved Applications
(Two-Stage Least Squares Results)

Dependent Variable:	AROI	ATERM	ATERM	AL/V
Independent variables				
RTERM		0.9569*		
		(63.31)		
RL/V				0.9670*
				(62.61)
PMI	0.0358*	0.2055	−3.3575	0.0077*
	(2.66)	(0.19)	(−1.01)	(1.92)
FHA-VA	−0.3086*	2.6548	−19.5518	−0.0199
	(−5.19)	(0.53)	(−1.30)	(−1.08)
P5-10	0.0375*	−2.4401*	−1.0597	−0.0081
	(2.16)	(−1.75)	(−0.25)	(−1.57)
P10-25	0.0257	−0.9460	−7.9450*	0.0015
	(1.57)	(−0.74)	(−2.05)	(0.32)
P25-50	0.0326	−2.5226	−19.4396*	−0.0032
	(1.62)	(−1.59)	(−4.09)	(−0.54)
P50-75	0.0294	−3.7715	1.1420	−0.0156
	(0.74)	(−1.18)	(0.12)	(−1.31)
$OB/Y	0.0166	−0.0031	11.9762	−0.0048
	(0.34)	(−0.00)	(0.99)	(−0.33)
TIME	0.0003			
	(1.45)			
BLACKS	0.0068	2.3046	−11.3583	0.0044
	(0.12)	(0.51)	(−0.82)	(0.26)
HISPAN	0.0118	−0.1452	−8.6493*	0.0002
	(0.76)	(−0.12)	(−2.29)	(0.05)
OTHRNW	−0.0223	1.6253	4.9447	0.0020
	(−0.63)	(0.57)	(0.57)	(0.19)
FEMALE	−0.0029	1.6373	4.5101	−0.0061
	(−0.13)	(0.91)	(0.82)	(−0.91)
UNMARR	−0.0072	−1.3552	−5.1246	0.0051
	(−0.42)	(−0.97)	(−1.21)	(0.99)
AGE<25	0.0114	−3.3082*	4.7613	−0.0153*
	(0.60)	(−2.18)	(1.04)	(−2.73)
A25-35	0.0180	−0.2840	4.2302	0.0010
	(1.43)	(−0.28)	(1.38)	(0.26)

t-values in parentheses.
* Indicates significance at the 5 percent level or greater. One-tail tests are applied where appropriate.

Table 6.4 *(Continued)*

San Antonio — Analysis of Mortgage Terms on Approved Applications
(Two-Stage Least Squares Results)

Dependent Variable:	AROI	ATERM	ATERM	AL/V
A55-65	0.0005	−2.6893	−20.8852*	0.0040
	(0.02)	(−1.23)	(−3.17)	(0.49)
AGE>65	0.0029	−0.4285	−3.6015	0.0044
	(0.07)	(−0.13)	(−0.37)	(0.37)
2NDY/Y	0.0370	4.2168	−2.2312	0.0166
	(1.27)	(1.78)	(−0.31)	(1.90)
%BLACK	−0.0005	−0.2738*	−1.6823*	−0.0002
	(−0.43)	(−2.95)	(−6.14)	(−0.59)
%HISPAN	−0.0008	0.0224	−0.2210	0.0000
	(−1.34)	(0.45)	(−1.48)	(0.01)
%OWNOC	0.0009*	−0.0838*	−0.2123*	0.0000
	(1.99)	(−2.40)	(−2.01)	(0.18)
%<1939	−0.0007	−0.0602	−0.2404*	−0.0001
	(−1.34)	(−1.51)	(−1.99)	(−0.39)
%<POV	0.0030*	0.0523	0.1253	0.0003
	(2.10)	(0.44)	(0.35)	(0.67)
S&L 1	0.0340	−2.4305	−0.0700	0.0084
	(1.30)	(−1.15)	(−0.01)	(1.06)
S&L 2	0.0599*	−0.0443	−9.960[illegible]*	−0.0002
	(3.54)	(−0.03)	(−2.38)	(−0.04)
S&L 3	0.0677*	−0.9019	−18.3808*	−0.0016
	(4.27)	(−0.69)	(−4.73)	(−0.33)
S&L 4	0.0655*	−1.2876	−1.2199	0.0083
	(3.79)	(−0.90)	(−0.28)	(1.58)
S&L 5	−0.0162	1.3516	6.2050	−0.0047
	(−0.44)	(0.45)	(0.69)	(−0.43)
S&L 6	−0.3247*	0.2013	3.3287	−0.0014
	(−5.93)	(0.04)	(0.24)	(−0.08)
S&L 7	0.0832	−3.0667	−45.0445*	0.0042
	(1.75)	(−0.79)	(−3.88)	(0.29)
S&L 8	−0.6603*	−1.5450	−2.2090	−0.0115
	(−22.13)	(−0.44)	(−0.21)	(−0.89)
S&L 9	0.0097	1.1706	−0.6346	0.0049
	(0.27)	(0.41)	(−0.07)	(0.46)
AROI		−1.2729	1.5752	−0.0148
		(−0.34)	(0.14)	(−1.06)

t-values in parentheses.
* Indicates significance at the 5 percent level or greater. One-tail tests are applied where appropriate.

Table 6.4 *(Continued)*

San Antonio — Analysis of Mortgage Terms on Approved Applications
(Two-Stage Least Squares Results)

Dependent Variable:	AROI	ATERM	ATERM	AL/V
ATERM	0.0001			0.0000
	(0.34)			(0.45)
AL/V	0.0794	−3.9271	82.6981*	
	(1.46)	(−0.91)	(6.63)	
ALOAN	−0.0006*			
	(−1.78)			
Intercept	9.5501*	38.4097	301.2351*	0.1511
	(112.41)	(1.05)	(2.73)	(1.11)
Mean Value of Dependent Variable	9.7650	350.0706	350.0706	0.8073
Number of Observations	510	510	510	510
Adjusted R^2	0.6024	0.9318	0.3713	0.9252
S.E.E.	0.1167	9.5061	28.8667	0.0352

t-values in parentheses.
* Indicates significance at the 5 percent level or greater. One-tail tests are applied where appropriate.

Toledo

Estimated coefficients for the three mortgage terms are given in Table 6.5. Column 1 shows that the market rate of interest, as represented by the time trend, the use of PMI or FHA-VA insurance, and the other mortgage terms are significant influences on the mortgage rate. In contrast to the Miami results, the mortgage rate here appears to increase with the term-to-maturity. Applicant age, race, sex, and marital status are all insignificant, except that applicants under 25 appear to receive slightly lower mortgage rates. Mortgage rates are about 10 basis points higher for properties over 50 years old. Of the five census tract coefficients, only that for the proportion of poverty population approaches significance. None of the neighborhood dummy variables is

significantly positive, implying that mortgage rates in Toledo city neighborhoods are not higher than they would be for comparable mortgages in the Toledo suburbs. This finding, which is contrary to the predictions of redlining in Toledo, should be emphasized because it is based on much better data than are usually available.

Columns 2 and 3 contain the estimated coefficients for the term-to-maturity equations. When the specification includes the requested term few other variables are significant. The age, race, sex, and marital status of the applicant are all insignificant, except that when using a weak, one-tail test of significance black applicants receive terms six months less than expected. On average, mortgage terms are about 12 months shorter on homes over 25 years old. None of the census tract averages is significant. The results, however, do strongly imply that mortgages in neighborhoods 1 and 2 are shorter than expected. Both of these are older, central city neighborhoods. Neighborhood 1 (Lagrange) is heavily Polish; neighborhood 2 (Stickney-Buckeye) is substantially Polish with about 30 percent black population.

When the requested term-to-maturity is omitted many more variables are significant and their magnitudes are much greater. For example, the term decreases substantially with the age of the property, and is shorter for "other nonwhites" and the unmarried. The mortgage term seems to increase with the percent black and decrease with percent owner-occupied — two unexpected results. Again several of the neighborhood dummy variables indicate significantly shorter terms. Of these some but not all have characteristics that are generally associated with redlining. Neighborhoods 2 (Stickney-Buckeye), 5 (Eastside), 7 (Nebraska), 18 (Old West End), and 19 (Parkside), are central city, older areas with ethnic or black concentrations. However, the hazard of concluding that geographical discrimination exists is indicated by observing that neighborhood 15 (Southwyck) also has a negative coefficient, yet this is one of the most exclusive residential locations in the area. Terms are also estimated to be shorter in neighborhoods 4 (Point Place) and 14 (Reynolds Corners). These are basically nonethnic, nonblack, outlying areas with substantial quantities of new and moderate- to high-priced housing. Unexpected results like these emphasize the value of the requested term in explaining the term received and imply that the estimates in column 3 must be used cautiously if at all.

Estimated coefficients for the loan-to-value equation are shown in column 4. As in the other SMSAs the requested ratio is the only important influence. Very few other variables are statistically significant, and the estimated coefficients are too small to be economically meaningful. The only significant neighborhood dummy variable is that for neighborhood 13 (Glendale). It is described as "typical post World War II

suburban community: new housing, winding streets, large lots, and broad lawns."[16] Plainly this is not the sort of community one would expect to have mortgage problems. The suggestion that loan-to-value granted is systematically less than the ratio requested does, therefore, make the important point that it is unwise to place too much emphasis on a single coefficient, even when the coefficient has the expected sign. In a study like this with many samples, many regressions, and many variables it is quite likely that some coefficients will be significant by usual standards purely by chance. It is better to base inferences about discrimination, including redlining, on overall patterns and consistency from one equation to another than on a single coefficient in a single equation. If lenders do discriminate, one should expect them to do so against all similar neighborhoods or classes of applicants in many parts of the application process. Evidence that suggests erratic discrimination in different parts of the process or against only some of very similar applicants or areas should be weighed very lightly.

Summary

The examination of mortgage terms in the three SMSAs implies that mortgage terms are strongly affected by market conditions and requested terms. There is little evidence that terms are varied to discriminate against applicants on the basis of age, race, sex, marital status, or the location of the property.

[16]Department of Community Development (City of Toledo), *A Guide To Toledo Neighborhoods 1977–78*, p. 26.

Table 6.5

Toledo — Analysis of Mortgage Terms or Approved Applications
(Two-Stage Least Squares Results)

Dependent Variable:	AROI	ATERM	ATERM	AL/V
Independent variables				
RTERM		0.9397*		
		(56.08)		
RL/V				0.9624*
				(83.45)
PMI	0.4066*	1.2777	−11.3639*	0.0082*
	(12.95)	(0.52)	(−2.13)	(1.88)
FHA-VA	−0.6220*	0.6380	31.4747*	−0.0010
	(−11.15)	(0.16)	(3.63)	(−0.14)
P5-10	0.0557	−2.9433	−6.2452	−0.0003
	(1.21)	(−0.91)	(−0.88)	(−0.04)
P10-25	0.0470	−1.0345	−11.5233*	−0.0012
	(1.28)	(−0.41)	(−2.07)	(−0.25)
P25-50	0.0364	−7.9284*	−33.4110*	−0.0017
	(0.94)	(−3.04)	(−5.94)	(−0.36)
P50-75	0.0840*	−11.4953*	−41.5675*	0.0001
	(1.93)	(−3.88)	(−6.50)	(0.01)
P>75	0.1090*	−13.4824*	−82.1721*	0.0119
	(1.74)	(−3.11)	(−8.99)	(1.50)
$OB/Y	0.0492	8.3526	−0.2214	0.0096
	(0.36)	(0.87)	(−0.01)	(0.56)
TIME	0.0043*			
	(12.45)			
BLACKS	0.0239	−6.4045	−6.6981	0.0048
	(0.40)	(−1.52)	(−0.73)	(0.64)
HISPAN	0.1146	−2.4925	24.6574	0.0026
	(0.92)	(−0.28)	(1.27)	(0.16)
OTHRNW	−0.1335	−3.3306	−53.5507*	0.0127
	(−1.18)	(−0.43)	(−3.14)	(0.90)
FEMALE	−0.0287	0.3031	16.9382*	0.0052
	(−0.65)	(0.10)	(2.49)	(0.93)
UNMARR	0.0145	−1.4525	−11.1516*	−0.0077*
	(0.44)	(−0.62)	(−2.17)	(−1.82)
AGE<25	−0.0800*	0.5845	−1.0260	0.0044
	(−2.39)	(0.25)	(−0.20)	(1.05)

t-values in parentheses.
* Indicates significance at the 5 percent level or greater. One-tail tests are applied where appropriate.

Table 6.5 *(Continued)*

Toledo — Analysis of Mortgage Terms on Approved Applications
(Two-Stage Least Squares Results)

Dependent Variable:	AROI	ATERM	ATERM	AL/V
A25-35	−0.0266	−0.1597	5.4982	0.0020
	(−1.01)	(−0.09)	(k 1.35)	(0.58)
A55-65	0.0305	2.1754	−4.5902	−0.0183*
	(0.53)	(0.53)	(−0.51)	(−2.47)
AGE>65	−0.0107	6.4789	−18.2900	−0.0174
	(−0.09)	(0.78)	(−1.01)	(−1.17)
2NDY/Y	0.0283	1.4081	4.1661	0.0009
	(0.47)	(0.33)	(0.45)	(0.11)
%BLACK	0.0007	−0.1262	0.7497*	−0.0002
	(0.34)	(−0.86)	(2.34)	(−0.79)
%HISPAN	0.0030	0.3103	−1.7497	−0.0001
	(0.23)	(0.34)	(−0.87)	(−0.05)
%OWNOC	0.0005	0.0276	−0.4145	0.0003
	(0.31)	(0.24)	(−1.67)	(1.61)
%<1939	0.0001	−0.0057	−0.1606	−0.0001
	(0.07)	(−0.08)	(−1.08)	(−1.03)
%<POV	0.0056	0.0502	−0.8663	0.0005
	(1.54)	(0.20)	(−1.55)	(1.15)
S&L 1	0.2115*	5.3525	37.4401*	0.0007
	(2.65)	(0.96)	(3.06)	(0.07)
S&L 2	0.0649	0.8822	−35.8860	−0.0083
	(0.48)	(0.09)	(−1.72)	(−0.48)
S&L 3	0.2412*	3.9862	23.7365*	−0.0004
	(3.16)	(0.74)	(2.00)	(−0.04)
S&L 4	0.1568	−1.2983	−13.2726	−0.0076
	(1.45)	(−0.17)	(−0.79)	(−0.55)
S&L 5	0.0734	−2.5375	31.6496*	−0.0050
	(1.84)	(−0.90)	(5.21)	(−0.99)
S&L 6	−0.0314	6.2560*	55.6045*	−0.0041
	(−0.93)	(2.69)	(11.76)	(−0.97)
S&L 7	−0.1006*	−2.0709	10.8620	−0.0001
	(−2.21)	(−0.64)	(1.53)	(−0.01)
S&L 8	0.3576*	0.0604	−1.2395	0.0074
	(2.69)	(0.01)	(−0.06)	(0.44)
S&L 9	0.4217*	2.9745	−30.9457	0.0031
	(3.33)	(0.33)	(−1.56)	(0.19)

t-values in parentheses.
* Indicates significance at the 5 percent level or greater. One-tail tests are applied where appropriate.

Table 6.5 *(Continued)*

Toledo — Analysis of Mortgage Terms on Approved Applications
(Two-Stage Least Squares Results)

Dependent Variable:	AROI	ATERM	ATERM	AL/V
S&L 10	−0.0077	−13.5200*	−11.0778	−0.0032
	(−0.17)	(−4.32)	(1.61)	(−0.57)
NBH 1[R]	−0.0496	−16.3494*	−3.6756	−0.0072
	(−0.37)	(−1.72)	(−0.18)	(−0.42)
NBH 2[R]	−0.0456	−23.6724*	−67.4404*	−0.0120
	(−0.40)	(−2.95)	(−3.85)	(−0.82)
NBH 3	−0.0894	5.3170	−3.0764	0.0132
	(−0.69)	(0.58)	(−0.15)	(0.80)
NBH 4	−0.0062	−0.4642	−17.7398	−0.0066
	(−0.09)	(−0.10)	(−1.72)	(−.77)
NBH 5[R]	−0.1312	−3.6568	−34.1773*	0.0085
	(−1.67)	(−0.66)	(−2.82)	(0.85)
NBH 6	−0.1712	8.7211	24.0847	0.0060
	(−0.88)	(0.63)	(0.79)	(0.24)
NBH 7[R]	−0.1308	−10.6459	−139.6452*	0.0105
	(−0.66)	(−0.76)	(−4.61)	(0.42)
NBH 8[R]	−0.0392	6.4337	−13.3825	0.0116
	(−0.49)	(1.14)	(−1.08)	(1.14)
NBH 9	−0.2838	10.0812	−6.6403	0.0095
	(−1.80)	(0.90)	(−0.27)	(0.47)
NBH 10	−0.0306	5.4649	8.5444	−0.0030
	(−0.40)	(1.00)	(0.71)	(−0.30)
NBH 11	0.0188	10.6061	22.2154	0.0107
	(0.17)	(1.36)	(1.30)	(0.76)
NBH 12	0.0832	−3.6837	−19.3239	0.0029
	(0.99)	(−0.62)	(−1.49)	(0.27)
NBH 13	−0.0556	2.7380	−2.7958	−0.0259*
	(−0.67)	(0.47)	(−0.22)	(−2.46)
NBH 14	−0.0096	−1.5746	−14.5363	0.0035
	(−0.20)	(−0.46)	(−1.92)	(0.56)
NBH 15	−0.0322	0.4491	−22.1148	0.0097
	(−0.32)	(0.06)	(−1.42)	(0.76)
NBH 18[R]	0.0456	−9.0347	−35.4350*	0.0127
	(0.40)	(−1.14)	(−2.03)	(0.88)
NBH 19[R]	−0.0724	16.0363	−34.9229	0.0109
	(−0.50)	(1.58)	(−1.57)	(0.60)

t-values in parentheses.
* Indicates significance at the 5 percent level or greater. One-tail tests are applied where appropriate.

Table 6.5 *(Continued)*

Toledo — Analysis of Mortgage Terms on Approved Applications
(Two-Stage Least Squares Results)

Dependent Variable:	AROI	ATERM	ATERM	AL/V
NBH 20	−0.0633 (−0.83)	−0.8435 (−0.16)	−0.5293 (−0.05)	0.0074 (0.76)
NBH 21	−0.0297 (−0.47)	4.4109 (1.00)	2.0530 (0.21)	0.0057 (0.71)
NBH 22	0.1106 (0.87)	−2.7608 (−0.31)	−13.1714 (−0.67)	0.0043 (0.27)
NBH 23	−0.0218 (−0.28)	5.5062 (0.99)	12.5036 (1.03)	0.0015 (0.15)
NBH 24	−0.0289 (−0.45)	4.6341 (1.03)	4.1250 (0.42)	0.0007 (0.09)
NBH 25	0.0300 (0.41)	1.2636 (0.25)	−3.4934 (−0.31)	0.0008 (0.09)
NBH 26	−0.0454 (−0.45)	−3.9877 (−0.56)	15.8019 (1.00)	0.0014 (0.11)
NBH 27	−0.0260 (−0.47)	−1.0648 (−0.27)	−9.8900 (−1.16)	−0.0070 (−1.00)
NBH 28	0.0538 (0.33)	3.8607 (0.34)	27.0606 (1.08)	0.0001 (0.00)
NBH 29	−0.2425* (−3.82)	3.0463 (0.68)	2.1293 (0.22)	−0.0131 (−1.62)
AROI		−4.5382 (−1.89)	9.4843 (1.81)	−0.0057 (−1.31)
ATERM	0.0008* (3.04)			−0.0000 (−0.00)
AL/V	0.4999* (5.10)	8.9595 (1.36)	160.9126* (12.25)	
ALOAN	−0.0037* (−3.97)			
Intercept	8.9408* (49.97)	55.1174* (2.20)	155.0152* (2.82)	0.0520 (1.14)
Mean Value of Dependent Variable	9.8872	311.5916	311.5916	0.7453
Number of Observations	901	901	901	901
Adjusted R^2	0.4942	0.8839	0.4409	0.9478
S. E. E.	0.3094	21.9358	48.1348	0.0396

t-values in parentheses.
* Indicates significance at the 5 percent level or greater. One-tail tests are applied where appropriate.

VII. Eleven Case Studies

The analysis in Section 5 of the decision to accept or reject an application for a mortgage found that Hispanic and black applicants were from 3 to 13 percentage points (30 to 160 percent) more likely to be rejected. If all relevant applicant and property characteristics have been included in the analysis, this result would be good evidence of discrimination. An opportunity, unique to this study, has been the chance to return to the loan application files of the lending institutions to see whether special features of the application, that could not be included in the analysis, might explain apparent discriminatory treatment.

To identify particular applications that might have encountered discrimination related to race, the logit equations in Appendix A were applied to the loan applications from each SMSA to obtain predicted outcomes. The coefficients for BLACKS and HISPAN were set equal to zero so that applications were evaluated as though submitted by whites. Rejected minority applications for which the predicted probability of rejection was less than about .15 were identified as cases of possible discrimination.[17] Subsequently, during a regular examination of one institution, the Federal Home Loan Bank Board's examiners obtained the loan application files for eleven cases of possible discrimination. Because of the passage of time and because some files were kept in branch offices rather than at the main office where the examination occurred, not all of the files for cases of possible discrimination were obtained, but there is no reason to suppose that the ones available are unrepresentative of them all. It is instructive, therefore, to summarize the features of each.

Eleven Possible Cases of Discrimination

Case 1 (predicted probability of rejection = .10): This application had been rejected for two reasons, a poor record of payment on previous loans and too high a ratio of payment to verified monthly income. The applicant disputed the credit characterization, and the credit bureau corrected two entries. However, the application for a mortgage was denied a second time because of the low verified income. In applying for the mortgage, the applicant claimed an annual income of about $33,000, but to substantiate this he submitted a federal tax form showing an adjusted gross

[17]Note that the BADCDT dummy variable is not included in the logit equation. That may explain why a number of the cases of possible discrimination seem to involve a rejection related to the applicant's credit history.

income of less than $13,000. From the mortgage application it is possible to see that most of the income claimed there was obtained from rental properties. Because it was not reported to the Internal Revenue Service, the lender seems to have regarded it as not verified.

For present purposes the important point is that had the calculation of probability of rejection used the applicant's verified income instead of the claimed income, the predicted probability would have been much greater.

Case 2 (predicted probability of rejection = .08): This applicant had a poor payment record on an existing mortgage. By the fall of 1978 when the application was filed, nine of the payments due in 1978 were late, and seven were late the previous year. Altogether, 21 payments were two or more months late, and one payment check had not been honored because of insufficient funds.

Case 3 (predicted probability of rejection = .04): This applicant, currently a renter, had twice been evicted for extremely slow rent payments, once the previous year (September 1977) and once three years before that (November 1974). The record also showed a small unsatisfied small-claims-court judgment against the applicant.

Case 4 (predicted probability of rejection = .10): This applicant was initially approved, contingent on verification of income and employment. Subsequently, the application was denied when these could not be verified. The applicant had just started a new business a few months before and claimed an income in the new business twice what he had previously earned.

Case 5 (predicted probability of rejection = .08): This applicant had no local employment.

Case 6 (predicted probability of rejection = .12): This applicant was a highly skilled professional with a responsible position. He requested a 90 percent loan, but this was denied because the amount exceeded the lender's loan standards for a 90 percent loan. The lender suggested that it would make an 80 percent loan, but the applicant was not interested.

Case 7 (predicted probability of rejection = .02): This application was erroneously described as rejected. Actually, the loan officer advised the applicant to assume an existing loan from the lender rather than to obtain a new mortgage as there would be considerable savings. The application was then deactivated by "denying" it.

Case 8 (predicted probability of rejection = .13): This application was denied because the applicant had had a job (as a truck driver) for only two

weeks prior to filing the application and had been unemployed for the previous 1½ years. The applicant had little reported net worth to assist him in maintaining payments if he became unemployed again.

Case 9 (predicted probability of rejection = .07): This application was initially approved, subject to verification of employment. The approval was rescinded shortly thereafter when it was learned that the applicant had been fired on the same day from a full-time job as the secretary-treasurer for one firm and from a part-time job as a bookkeeper for another.

Case 10 (predicted probability of rejection = .05): The applicant had a history of slow payments on previous loans from several finance companies. The applicant explained this by saying she had gone through a divorce and at the same time her son had serious medical problems not covered by insurance. Her former husband paid none of the bills. She planned to sell her present house and use some of the equity to pay off outstanding bills. By doing this she hoped to re-establish a good credit rating.

The applicant also had a history of late payments on her existing mortgage. She said that her salary payment schedule was such that she could not usually pay at the first of the month. Also, she said that the firm holding the mortgage had been rude to her initially, so she had no desire to cooperate with them.

The lender's work sheets show that the ratio of total housing expense to net effective income was 41%, or 35.6% including income from a part-time job. This exceeded the FHA guideline of 35%. Total fixed obligations were 58% of net effective income, or 50.8% including part-time income. This also exceeded the FHA guidleine of 50%.

The loan file contained memoranda from several loan officers reviewing this case. In general they believed that repaying the requested loan imposed too great a burden on the applicant. It was suggested that if the applicant could manage a larger down-payment, the lender would approve a smaller loan having smaller monthly payments.

Case 11 (predicted probability of rejection = .05): This application was approved. The LARS data, despite the care taken in collecting and editing, were incorrect.

Conclusions

The important implication of these eleven cases for analyses of mortgage lending, like those in sections 4, 5, and 6, is that any implications of discrimination must be regarded as only the first tentative step in an investigation. Many special considerations, unique to each

case, will have been omitted of necessity from the general analysis; there will be errors in collecting and processing the data even under optimal circumstances; and applicants are likely to claim things that are not true. Indeed, the single most important addition to a data set like that used in this study would be lender verification of critical financial characteristics.

My own judgment is that none of these eleven cases could be described as instances of racial discrimination, unless standards such as for local employment (Case 5) or for a steady work history (Case 8) would not have been applied equally to white applicants. Applications that initially seemed most likely to involve discrimination were (1) not really rejected, (2) were rejected because accepting them would violate general loan standards, or (3) were rejected because crucial information supplied by the applicant was not true or could not be verified. It would be incorrect to extrapolate from these eleven cases to conclude that discrimination is absent from mortgage lending. But these cases do show that careful attention to the details of any case is necessary, particularly when conclusions about discrimination depend upon an applicant's unverified claims about income, wealth, employment, and credit history.

VIII. Summary and Conclusions

The evidence of discrimination on the basis of age, race, sex, marital status, and property location is summarized in Tables 8.1 — 8.5 in a form easy to apprehend visually. More complete, verbal summaries can be found at the end of each empirical section, and there is no need to repeat them here. It scarcely needs to be said that summaries of any sort

Table 8.1

Evidence of Discrimination in Appraisal Practices

SMSA:	Miami	San Antonio	Toledo
Applicant or Property Characteristic			
BLACKS	+	?	0
HISPAN	0	0	?
OTHRNW	0	0	0
FEMALE	0	0	0
UNMARR	0	0	0
AGEAPP	+	0	0
%BLACK	0	0	0
%SPAN	0	0	0
%OWNOC	0	0	0
%<1939	0	+	−
%<POV	0	0	0
NEIGHBORHOOD	NA	NA	++

0 Indicates no evidence of discrimination on this basis
− Indicates evidence of slight discrimination on this basis
−− Indicates evidence of substantial discrimination on this basis
+ Indicates evidence of slight favoritism on this basis
++ Indicates evidence of substantial favoritism on this basis
NA No data available
? Indicates insufficient data

must omit the qualifications and shadings essential to a full understanding of the evidence. Tables 8.1 — 8.5 reflect many judgments about methods, specifications, and the relative importance of differing results; other persons might summarize the findings somewhat differently. One particular caution is that inferring discrimination related to the five census tract variables is especially uncertain. The data may be out-of-date because of growth and changes since 1970, especially in San Antonio. Also, these variables may be closely related to risk, and the results may show only that lenders recognize risk and respond appropriately.

The study included three major analyses, one related to

Table 8.2

Evidence of Discrimination in Denial of Applications

SMSA:	Miami	San Antonio	Toledo
Applicant or Property Characteristic			
BLACKS	–	?	– –
HISPAN	–	–	?
OTHRNW	0	0	0
FEMALE	0	0	0
UNMARR	0	0	0
AGEAPP	0	0	0
%BLACK	0	0	0
%SPAN	–	0	0
%OWNOC	0	0	0
%<1939	0	–	0
%<POV	–	0	0
NEIGHBORHOOD	NA	NA	0

0 Indicates no evidence of discrimination on this basis
– Indicates evidence of slight discrimination on this basis
– – Indicates evidence of substantial discrimination on this basis
\+ Indicates evidence of slight favoritism on this basis
\+ + Indicates evidence of substantial favoritism on this basis
NA No data available
? Indicates insufficient data

appraisals, a second, to the decision to accept or reject an application, and a third, to the terms for approved mortgages. Of these, only the analysis of the decision to accept or reject would support an inference of discrimination. Rejection rates for blacks and Hispanics were higher by 3 to 13 percentage points (30 to 160 percent) than for apparently comparable whites. Even though the acceptance rate for minority applicants in the sample is 85 to 90 percent, the higher rejection rate is consistent with discrimination. The evidence from the eleven cases, described in Section 7, demonstrates, however, that any inference of discrimination must be held very tentatively. Each of those cases was selected as a possible

Table 8.3

Evidence of Discrimination in Mortgage Interest Rates

SMSA:	Miami	San Antonio	Toledo
Applicant or Property Characteristics			
BLACKS	0	?	0
HISPAN	0	0	?
OTHRNW	0	0	0
FEMALE	0	0	0
UNMARR	0	0	0
AGEAPP	0	0	0
%BLACK	+	0	0
%SPAN	−	0	0
%OWNOC	+	−	0
%<1939	+	0	0
%<POV	0	−	0
NEIGHBORHOOD	NA	NA	0

0 Indicates no evidence of discrimination on this basis
− Indicates evidence of slight discrimination on this basis
−− Indicates evidence of substantial discrimination on this basis
+ Indicates evidence of slight favoritism on this basis
++ Indicates evidence of substantial favoritism on this basis
NA No data available
? Indicates insufficient data

instance of discrimination, but in each the rejection could be explained plausibly on the basis of information not available for the original analysis. Because of this, I consider the analysis of the decision to accept or reject as providing, at most, weak evidence of modest discrimination.

The reader should be reminded of the point made in Section 1: because data from all associations in an SMSA were pooled, all conclusions apply to the associations as a group and do not exclude the possibility that certain individual associations may discriminate. However, the results do imply that discrimination by individual associations, if it exists, cannot be widespread and has little effect on the opportunities

Table 8.4

Evidence of Discrimination in Mortgage Term to Maturity

SMSA:	Miami	San Antonio	Toledo
Applicant or Property Characteristic			
BLACKS	–	?	0
HISPAN	0	–	?
OTHRNW	0	0	0
FEMALE	0	0	+
UNMARR	0	0	–
AGEAPP	0	0	0
%BLACK	–	–	+
%SPAN	0	0	0
%OWNOC	0	–	0
%<1939	0	–	0
%<POV	0	0	0
NEIGHBORHOOD	NA	NA	–

0 Indicates no evidence of discrimination on this basis
– Indicates evidence of slight discrimination on this basis
– – Indicates evidence of substantial discrimination on this basis
\+ Indicates evidence of slight favoritism on this basis
\+ + Indicates evidence of substantial favoritism on this basis
NA No data available
? Indicates insufficient data

open to minorities in the market. If it were widespread and did have an effect, it would be detectible in the pooled data.

One final observation concerns the contrast between widespread allegations about mortgage discrimination including redlining and the lack of evidence confirming discrimination from this study and others. This implies the importance of examining for possible prescreening activities. There are either major misunderstandings or active, successful ways of preventing applications from appearing in the formal records. It would be difficult but very useful to know which it is.

Table 8.5

Evidence of Discrimination in Approved Loan/Value

SMSA:	Miami	San Antonio	Toledo
Applicant or Property Characteristic			
BLACKS	0	?	0
HISPAN	0	0	?
OTHRNW	0	0	0
FEMALE	0	0	0
UNMARR	0	0	0
AGEAPP	0	0	0
%BLACK	0	0	0
%SPAN	0	0	0
%OWNOC	0	0	0
%<1939	0	0	0
%<POV	0	0	0
NEIGHBORHOOD	NA	NA	0

0 Indicates no evidence of discrimination on this basis
– Indicates evidence of slight discrimination on this basis
–– Indicates evidence of substantial discrimination on this basis
+ Indicates evidence of slight favoritism on this basis
++ Indicates evidence of substantial favoritism on this basis
NA No data available
? Indicates insufficient data

Appendix A

Analysis of Application Denials[a]
(Logit Results)

Independent Variables[b]	Miami	San Antonio	Toledo
RLN/V	4.2969*	7.0386*	6.4439*
	(6.05)	(2.43)	(3.95)
PMI	−0.6525*	−2.4951*	0.1659
	(−3.18)	(−2.94)	(0.41)
FHA-VA	−1.5450*	−12.9178)	0.3865
	(−3.17)	(−0.07)	(0.59)
P5–10	−0.2222	1.6164*	0.2463
	(−0.88)	(1.79)	(0.35)
P10–25	0.0174	2.5083*	−0.1855
	(0.09)	(3.20)	(−0.33)
P25–50	0.3272	1.0200	0.2268
	(1.44)	(1.04)	(0.43)
P50–75	0.4462	0.4635	0.5633
	(0.80)	(0.25)	(1.01)
P>75	1.4139		2.4948*
	(1.15)		(3.98)
PAY/Y	4.0509*	19.0053	−8.2227
	(3.29)	(1.32)	(−0.85)
PAY/Y2	−5.6935*	−35.7044	36.7181
	(−2.22)	(−0.78)	(1.18)
$OB/Y	4.0936*	6.4347*	3.3735*
	(5.88)	(2.25)	(2.44)
BLACKS	0.8388*	1.1649	1.5090*
	(2.19)	(0.73)	(2.50)
HISPAN	0.3679*	0.8845	1.0289
	(1.91)	(1.43)	(0.94)
OTHRNW	0.0961	−12.0671	0.2702
	(0.21)	(−0.13)	(0.22)

Appendix A *(Continued)*

Analysis of Application Denials[a]
(Logit Results)

Independent Variables[b]	Miami	San Antonio	Toledo
FEMALE	0.1348	−1.9556	0.2697
	(0.55)	(−1.78)	(0.53)
UNMARR	0.0150	0.5432	−0.2397
	(0.07)	(0.75)	(−0.60)
AGE<25	0.2478	0.6065	0.3009
	(0.89)	(0.77)	(0.77)
A25–35	0.0406	0.4895	−0.4533
	(0.24)	(0.76)	(−1.30)
A55–65	−0.2182	−10.6398	0.5137
	(−0.80)	(−0.16)	(0.58)
AGE>65	−1.2002*	0.2718	−1.0689
	(−2.10)	(0.19)	(−0.65)
2NDY/Y	−0.3671	−1.1047	−0.8634
	(−0.87)	(−0.79)	(−1.00)
%BLACK	0.0065	−0.0448	−0.0096
	(1.02)	(1.58)	(−0.50)
%SPAN	0.0083	0.0371	−0.0463
	(1.13)	(1.57)	(−0.29)
%OWNOC	0.0026	0.0032	0.0199
	(0.59)	(0.17)	(0.96)
%<1939	−0.0062	0.0230	0.0092
	(−0.66)	(1.24)	(0.70)
%<POV	0.0293*	0.0010	0.0692
	(1.76)	(0.02)	(1.25)
S&L 1	−1.1571*	2.8100*	−1.1284
	(−2.18)	(2.72)	(−0.70)
S&L 2	0.0584	0.3644	3.7070*
	(0.27)	(0.43)	(3.25)

Appendix A *(Continued)*

Analysis of Application Denials[a]
(Logit Results)

Independent Variables[b]	Miami	San Antonio	Toledo
S&L 3	−2.2428*	0.1245	−7.3467
	(−4.63)	(0.15)	(−0.25)
S&L 4	0.2115	0.0206	1.3767
	(0.77)	(0.02)	(1.35)
S&L 5	−0.4529	0.2723	2.4900*
	(−1.26)	(0.21)	(5.42)
S&L 6	0.5458*	2.6879	0.3483
	(2.19)	(1.36)	(0.72)
S&L 7	−1.7718*	−9.2075	1.6339*
	(−3.55)	(−0.06)	(2.52)
S&L 8	−1.5383*	2.4227*	−8.1706
	(−2.08)	(2.60)	(−0.14)
S&L 9	−1.8287	−3.1950	1.1569
	(−1.67)	(−1.46)	(0.96)
S&L 10	−1.1748*		−1.4209
	(−2.14)		(−1.52)
S&L 11	0.1021		
	(0.24)		
S&L 12	−10.9560		
	(−0.07)		
S&L 13	−11.0216		
	(−0.07)		
S&L 14	−0.1862		
	(−0.17)		
S&L 15	−0.2696		
	(−0.40)		
S&L 16	−0.5691		
	(−0.73)		

Appendix A *(Continued)*

Analysis of Application Denials[a]
(Logit Results)

Independent Variables[b]	Miami	San Antonio	Toledo
NBH 1[R]			−2.1547
			(−1.47)
NBH 2[R]			−0.9349
			(−0.85)
NBH 3			−2.7521
			(−1.60)
NBH 4			0.4050
			(0.57)
NBH 5[R]			−1.5307
			(−1.54)
NBH 6			−11.2403
			(−0.12)
NBH 7[R]			−2.8894
			(−1.66)
NBH 8[R]			−0.6504
			(−0.72)
NBH 9			0.4291
			(0.36)
NBH 10			0.0833
			(0.10)
NBH 11			−8.8019
			(−0.20)
NBH 12			0.8599
			(0.95)
NBH 13			0.6857
			(0.72)
NBH 14			0.2972
			(0.48)

Appendix A *(Continued)*

Analysis of Application Denials[a]
(Logit Results)

Independent Variables[b]	Miami	San Antonio	Toledo
NBH 15			1.0763
			(0.87)
NBH 18[R]			−1.3289
			(−1.19)
NBH 10[R]			−0.7290
			(−0.54)
NBH 20			−3.9673
			(−1.47)
NBH 21			−0.2271
			(−0.27)
NBH 22			−9.1186
			(−0.16)
NBH 23			0.1893
			(0.16)
NBH 24			−0.2052
			(−0.24)
NBH 25			0.7751
			(0.84)
NBH 26			−7.2526
			(−0.17)
NBH 27			−0.1636
			(−0.19)

t-values in parentheses.
* Indicates significance at the 5 percent level or greater. One-tail tests are applied where appropriate.
[a] Results are shown only for specifications without BADCDT. Equations specified with BADCDT would not converge, possibly because no applications with "unacceptable credit" were accepted.
[b] Variable definitions are given in Table 5.1.

Appendix A *(Continued)*

Analysis of Application Denials[a]
(Logit Results)

Independent Variables[b]	Miami	San Antonio	Toledo
NBH 28			−7.9015
			(−0.11)
NBH 29			0.7563
			(0.97)
Intercept	−7.2929*	−14.6065*	−11.7360*
	(−9.84)	(−4.37)	(−4.87)
Dependent Variable	DENIED	DENIED	DENIED

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